DOCUMENT RESUME

ED 078 419 CS 200 478

AUTHOR	Farrell, Edmund J.
TITLE	Deciding the Future: A Forecast of Responsibilities of Secondary Teachers of English, 1970-2000 AD.
INSTITUTION	National Council of Teachers of English, Urbana, Ill.
PUB DATE	71
NOTE	198p.; NCTE Research Report No. 12
AVAILABLE FROM	National Council of Teachers of English, 1111 Kenyon Road, Urbana, Ill. 61801 (Stock No. 14656, $3.00 non-member, $2.70 member)
EDRS PRICE	MF-$0.65 HC-$6.58
DESCRIPTORS	Discovery Learning; Educational Change; *Educational Innovation; *English Education; Individualized Instruction; *Preservice Education; Relevance (Education); *Secondary Education; Student Motivation; *Teacher Education; Teacher Responsibility

ABSTRACT

This document is a slightly revised version of author's Ph.D. Dissertation, "A Forecast of Responsibilities of Secondary Teachers of English 1970-2000 A.D., with Implications for Teacher Education" (ED 049 253). A study in two parts, Part I presents the need for future planning in education; discusses briefly methodologies for forecasting the future; explains why the Delphi technique was chosen for forecasting; describes the selection of experts to participate in the study; examines forces within the society that may affect the future functioning of education as an institution. Part II presents the forecasts of panelists in learning theory, educational technology, secondary curriculum, and English; and discusses some general implications of the study for programs of teacher education and some specific implications for the preservice education of secondary teachers of English. (This document previously announced as ED 053 138.) (DB)

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NCTE Research Report No. 12

Deciding *the Future:

*A Forecast of Responsibilities of Secondary Teachers of English, 1970-2000 AD

EDMUND J. FARRELL

CS 200 478

National Council of Teachers of English
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Library of Congress Catalog Card Number 75-164881
ISBN 0-8141-1465-6
NCTE Stock Number 14656

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1111 Kenyon Road, Urbana, Illinois 61801
Printed in U.S.A.

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National Council of Teachers of English

Research Report No. 12

A great number of English teachers in both high school and college have expressed publicly or privately that the world is too much with them. By this they mean not what Wordsworth meant, that life has become too materialistic, but that there seem to be too many things in the world that impinge upon them as professionals and as people. Not too long ago the teaching of English seemed relatively sure: there was the language that had rules of grammar and spelling; there was writing that had certain boundaries of decency; and there was literature which was enshrined in certain anthologies or reading lists. Matters of learning theory, of new media, of new genres, of new grammars, of new attitudes towards language, of new modes of composing, none of these had penetrated the purview of the English teacher. Nor had there come the student rebellions, the demands for accountability, the teacher's sense of being a member of a labor force rather than a professional, or the sense that governmental policies in foreign and domestic affairs affected the lives and work of English teachers. "All, all is changed utterly," and something terrible seems to be born, although it is not necessarily the beauty of which Yeats spoke.

Given the multiplicity and fecundity of change and given the immensity of the problems that face the world, problems ecological, psychological, economic, educational, social, political, and the like, the teacher of English is even more at a loss than he might have been only five years ago. We are in an age in which the present and the future rush at us, and in which we have barely a chance to take stock of where we are. The teacher's decisions become even more frenzied. How is he to begin to make those decisions?

In the past, the teacher has had research to help him with his problems. Research like that in composition which told him about the inefficacy of almost anything he did. Research in language that told him something about people's dialects, but had not fully placed those dialectical matters in their political perspective; research in literature that barely began to show forth the facets of student response. Given the paucity of research in what is, it almost seems presumptuous that someone in English would do research on what may be.

Yet Edmund Farrell has so done, and done it with a penetration that is rare even in studies on what is. Not only does this volume summarize the issues that confront the world and the teacher in the next generation, but it encapsulates the best guesses of experts in technology, psychology, curriculum, and English teaching as to what might be expected between now and the year 2000. As one looks through this volume, one wonders whether to view man's future as a juggernaut or as a series of cycles within cycles. Some of the assembled experts clearly take the linear approach: either the world is getting better every day or it is going straight to perdition. Some, on the other hand, take the position that things will move in some sort of a cyclical fashion, much in the manner of the earth's movement in and out of ice ages. Certainly it is easy to predict that technology will produce increasingly sophisticated machinery to deal with increasingly complex problems, but it is harder to predict whether man will accept these solutions or whether he will reassert his Luddite tendencies and smash the complex machines. The matter of prediction becomes increasingly complicated the more one puts human nature into the equation. Such was the case with the American budgeting system (PPBS), which is capable of determining strike efficacies of missiles and bombers, but which is less capable of predicting the relative detriment done the state of a nation's welfare by alleged massacres or by technical incursions into enemy territory. Mr. Farrell's work points up the disparity between the purely mechanical predictions and those predictions which seek to include the vagaries of human nature.

In addition to the problems of prediction, Mr. Farrell makes a signal contribution to research by the very fact that he has sought to locate at least a hint of what might be expected within the next generation. Whether his statistics prove to be fully validated or not is beside the point; it is a question of negligible interest compared to the question of whether the English teacher can prepare himself for such phenomena as drug-induced learning, increased student dissatisfaction, decreased privacy, speeding up of learning, sophisticated use of computers in instruction, wall television screens, student involvement in curriculum construction, increased integration, and greater concern for nonstandard dialects, among the many probabilities Mr. Farrell adumbrates.

As one of the initial participants who was somewhat skeptical of what the study might produce when I was being bombarded by Mr. Farrell's questionnaires, I can now say that I do not retract any of my own predictions, but I see them in a much larger context thanks to the study, and I recognize anew the problems we all face of separating prediction from desire. Thanks to the completed study, I think I am now better prepared to plan the teacher training curriculum at my institution, and certainly prepared to undertake the training of teacher-trainers. For them and for anyone interested in the curriculum and in teacher training, this book should be standard reading at least for the foreseeable present.

Alan C. Purves
For the Committee on Research

TABLE OF CONTENTS

RESEARCH REPORT NO. 12 v

LIST OF TABLES xi

PREFACE xiii

ACKNOWLEDGMENTS xvii

PART I. PURPOSES AND CONTEXT 1

1. THE PROBLEM AND THE PURPOSES OF THE STUDY 3
   - The Problem 3
   - Purposes of the Study 6
   - Background of the Problem and Overview of Its Development 7
2. METHODOLOGY 33
3. GLIMPSES: PRESENTS AND PROSPECTS I 41
   - Introduction 41
   - Population 41
   - Violence, Weaponry, and War 44
   - Natural Resources 48
   - Urbanization 50
   - Income and Employment 56
   - The Computer, Cybernation, and Leisure 62
4. GLIMPSES: PRESENTS AND PROSPECTS II 69
   - Growth, Storage, and Retrieval of Knowledge 69
   - Communications 73
   - Biological "Advances" 83
   - Values 93

PART II. FORECASTS 105

5. LEARNING THEORY 107

6. EDUCATIONAL TECHNOLOGY 117

7. SECONDARY CURRICULUM 129

8. ENGLISH 141

9. TEACHER EDUCATION 159

General Implications for Programs of Teacher Education 159

Specific Implications for Programs of Teacher Education in English 161

Afterthoughts 173

SELECTED BIBLIOGRAPHY 177

APPENDIX 185

LIST OF TABLES

Table Page

1. Percentage of Responses to Questionnaire 2 36
2. Percentage of Responses to Questionnaire 3 37
3. Percentage of Responses to Questionnaire 4 37

Questionnaire 2

4. Learning Theory: Items with 50% Probability of 20% Implementation by 1980-1999 107
5. Learning Theory: Items with 40-49% Probability of 20% Implementation by 1980-1999 109
6. Learning Theory: Items Failing to Reach 40% Probability of 20% Implementation by 1999 110

Questionnaire 3

7. Learning Theory: Items with 50% Probability of 20% Implementation by 1990-1999 112
8. Learning Theory: Items with 40-49% Probability of 20% Implementation by 1995-1999 112
9. Learning Theory: Items Failing to Reach 40% Probability of 20% Implementation by 1999. 113

Questionnaire 2

10. Educational Technology: Items with 50% Probability of 20% Implementation by 1985-1999 117
11. Educational Technology: Items with 40-49% Probability of 20% Implementation by 1980-1999 118
12. Educational Technology: Items Failing to Reach 40% Probability of 20% Implementation by 1999. 119

Questionnaire 3

13. Educational Technology: Items with 50% Probability of 20% Implementation by 1975-1999. 121
14. Educational Technology: Items with 40-49% Probability of 20% Implementation by 1995-1999 122
15. Educational Technology: Items Failing to Reach 40% Probability of 20% Implementation by 1999. 123

Table Questionnaire 2 Page

16. Secondary Curriculum: Item with 50% Probability of 20% Implementation by 1975-1999 129
17. Secondary Curriculum: Items with 40-49% Probability of 20% Implementation by 1980-1999 132
18. Secondary Curriculum: Items Failing to Reach 40% Probability of 20% Implementation by 1999 132

Questionnaire 3

19. Secondary Curriculum: Items with 50% Probability of 20% Implementation by 1975-1999 134
20. Secondary Curriculum: Item with 40-49% Probability of 20% Implementation by 1990-1999 134
21. Secondary Curriculum: Item Failing to Reach 40% Probability of 20% Implementation by 1999 135

Questionnaire 2

22. English: Items with 50% Probability of 20% Implementation between 1975 and 1999 144
23. English: Items with 40-49% Probability of 20% Implementation between 1975 and 1999 146
24. English: Items Failing to Reach 40% Probability of 20% Implementation by 1999 148

Questionnaire 3

25. English: Items with 50% Probability of 20% Implementation between 1985 and 1999 149
26. English: Items with 40-49% Probability of 20% Implementation by 1980-1999 150
27. English: Items Failing to Reach 40% Probability of 20% Implementation by 1999 152

Questionnaire 4

28. English: Items Which, If Implemented, Will Have from *Considerable* to *More Than Some* Bearing on the Responsibilities of Secondary Teachers of English 162
29. English: Items Ranging from *Necessary* to *Highly Desirable* in the Preservice Education of Secondary Teachers of English 167

PREFACE

Alfred North Whitehead once asserted that knowledge does not keep any better than fish, an assertion more proper to our televised, computerized, transistorized times than to his. One who attempts today to assay the present in order to anticipate the future of education knows that his research will smell musty by the time it reaches print. Morning headlines appear quaint by nightfall.

In the relatively brief time since the completion of the dissertation from which this monograph derives (our solar system is estimated to be almost five billion years old; the final period was put on the dissertation November 1969), the normal flow of school life has been repeatedly disrupted by such matters as student concerns about ecological crises; U.S. troop movements into Laos; the slaying of black students in Mississippi and white students in Ohio; inequities accorded women in the society.

In this same brief time, the stock market has slumped; teachers have increasingly been asked to state behavior and performance objectives and thereby to become economically accountable for the success of their instruction; parents, police, and educators have voiced greater concern about students' uses of drugs; a gene has been synthetically constructed in the laboratory; some children in Omaha have been administered drugs to increase their attention spans in school.

Education has become highly sensitized to social, political, economic, and technological forces, forces which students are sometimes more aware of than are their mentors. Too, the traditional immunity of secondary students from the militancy of their elders in college is fading: one who has read the excerpts from the high-school underground press in *How Old Will You Be in 1984?* ed. Diane Divoky (Avon/Discus, 1969), and *Our Time Is Now*, ed. John Birmingham (Morrow, 1970), as well as the essays in *The High School Revolutionaries*, ed. Marc Libarle and Tom Seligson (Random House, 1970), knows that a growing number of adolescents are protesting, sometimes violently, what they regard as an archaic curriculum, institutionalized racism and conformity, adult hypocrisy, American imperialism, and materialistic values. Teachers who do not remain aware of the forces stimulating discontent and demands for change find they cannot communicate with youth: worse, like Orwell in "Shooting an Elephant," they may be driven mindlessly into change by the expectations of their audience.

The purpose underlying the dissertation was to help teachers in preservice educational programs anticipate and knowledgeably participate in change during their professional careers. For two reasons no attempt has been made to include information in the monograph from the considerable number of studies of the future that have appeared since the dissertation was completed: first, by the time the manuscript was revised to incorporate recently published studies, those studies would have been superseded by still more recent studies; second, the dissertation was an attempt to break ground, not to be either a definitive or a last word.

One thing is certain: "the times they are a-changing." Where the society is at this point of time is not where it was yesterday, and where it is tomorrow will not be where it is now. How to make education as an institution intelligently responsive to and at times in the vanguard of change should profoundly concern us all.

The monograph can be regarded as a study in two parts, part I consisting of chapters 1 through 4, part II of chapters 5 through 9.

Part I presents in chapters 1 and 2 the need for future planning in education: limits the scope of the study to a forecast of the responsibilities and behavior of secondary teachers of English; discusses briefly methodologies for forecasting the future; explains why the Delphi technique was chosen as the method for forecasting; and describes how experts were selected to participate in the study. Chapters 3 and 4 examine some forces now operative in either incipient or well-developed stages within the society, forces which may directly affect the future functioning of education as an institution or which may become part of the cultural ambience of the society, contributing to its "tone" and, of necessity, that of its institutions.

What may seem to the reader to be explorations in chapters 3 and 4 of byways far from the main course of the study do not seem so to the author, who has been accused by one friend of possessing an insatiable (and undiscriminating?) curiosity and by another of being a mystic who intuits relationships unperceived by his more rational colleagues. The accuracy of the charges can be held in abeyance until the future doffs its multiform mask; in the meantime the chapters can stand in the background providing an opportunity for the reader to glance occasionally beyond the forecasts of the panelists as these come into relief, and to remind himself thereby that education does not and will not exist in a societal vacuum. Further, through comparing the prospects of the future presented in chapters 3 and 4 to the forecasts of the panelists in chapters 5 through 8, the reader is free to draw whatever inferences he wishes.

If, while exploring byways, the author has relied now and then on information which has appeared in newspapers or mass circulation periodicals, he has done so not out of any preference for the sensational but out of realization that information passes more quickly into the popular press than it does into the more carefully edited and more leisurely paced scholarly publications, where, by the time it appears, it is often both less sensational and obsolete. To sense the rapidity of change in a fast-changing society, one does better with TV news or the morning newspaper than he does with *PMLA* or *The American Scholar.*

Part II systematically presents in chapters 5 through 8 the forecasts of the panelists in learning theory, educational technology, secondary curriculum, and English. Chapter 9 discusses some general implications of the study for programs of teacher education and some specific implications for the preservice education of secondary teachers of English. No grandiose or even humble attempt is made to relate the chapters in part II to those in part I. Any such attempt would have fallen outside the scope of the study and of the author's ability to divine the future, which he regards not as predetermined reality but as a consequence of choices, some of which will be made by the reader: it is the author's hope that the study will contribute to their being wise ones.

ACKNOWLEDGMENTS

My debts are many. To those who encouraged the study, who contributed valuable time and thought to its design and to its completion, I am particularly grateful. Among this group are the following persons:

The members of my dissertation committee at the University of California, Berkeley—James C. Stone (chairman), T. Bentley Edwards, and Anthony Ostroff;

The five educational leaders who selected experts within their fields to assist in the study—

Robert Hogan, Executive Secretary, National Council of Teachers of English; Michael Shugrue, Assistant Secretary for English, Modern Language Association; T. Bentley Edwards, Professor of Education, University of California, Berkeley; Robert Gagné, Professor of Education, then at the University of California and now at Florida State University; Donald Hatfield, Director of the Educational Media Center, University of California, Berkeley;

The eighty experts who responded to cumbersome questionnaires with good humor, intelligence, and perspicuity;

William McCormick, whose advice on computer programing and statistical analysis was invaluable;

The members of my family—

David and Kevin, who knew when to play with Dad and when not to, and Jo Ann, who has served as typist, key puncher, mailman, keeper of the files, raiser of flagging spirits, and loving wife to me and fond mother to our children. Without her, both manuscript and I would be the less.

E.J.F.

Urbana, Illinois
August 1970

Part I

Purposes and Context

CHAPTER 1

THE PROBLEM AND THE PURPOSES OF THE STUDY

The Problem

But, Mousie, thou art no thy lane,
In proving foresight may be vain:
The best-laid schemes o' mice an' men,
        Gang aft agley,
An' lea'e us nought but grief an' pain,
        For promis'd joy!

—Burns

A central concern for those engaged in secondary programs of teacher education should be to help prospective secondary teachers to anticipate educational change and thereby to encourage their participating in and contributing to the direction of that change during their professional careers. For reasons that should come into focus in the body of this study, education has been failing to respond adequately to a fast-changing society, one in which new ideas, new issues, new technology, and new social patterns demand new priorities and performances from those who are at the center of the educational process, the teachers. The consequence of this failure has been a widening schism between the environment of the school and the environment of the young when out of school. On this point McLuhan, one of the most vocal, challenged, and perhaps astute critics of contemporary education, asserts:

> We haven't really cottoned on to the fact that our children work furiously, processing data in an electrically structured information world; and when these children enter a classroom . . . they encounter a situation that is very bewildering to them. The youngster today, stepping out of his nursery or TV environment, goes to school and enters a world where the information is scarce but is ordered and structured by fragmented, classified patterns, subjects, schedules. He is utterly bewildered because he comes out of this intricate and complex integral world of electric information and goes into this nineteenth-century world of classified information. . . . The educational establish-

> ment is a nineteenth-century world of classified data much like any factory set up with its inventories and assembly lines. The young today are baffled because of this extraordinary gap between these two worlds.[1]

In prose less colloquial, the prestigious Research and Policy Committee of the Committee for Economic Development (CED), the latter committee comprised of over 200 leaders in industry, banking, publishing, and education, writes:

> Already a wide gap has opened between the child and the adult teacher in the matter of learning habits. The typical child has been reared in an environment of audio-visual electronics. Most of our teachers matured in a world of magazines and books. The child will read books—often more than his teacher before him—but it is natural for him to learn through a variety of media. From their preschool years most children have been at home with television and radio, and the most complicated electronic devices often seem less mysterious to them than to their parents and teachers.[2]

McHale believes that the problem is that areas of formal education dealing with the symbolic value content of our culture do so almost entirely in terms of the past:

> By and large, they avoid immediate relevance to the external cultural environs in which the person finds himself. Outside the school, university or other educational institution these environs are those of the film, TV, radio, the pictorial magazine and massive "advertisement" of an enormously proliferated "mass" culture brought into being by our accelerated technology. It is largely within these media, now on a global scale, that the symbolic and value communication of our cultural situation is carried on.[3]

As a consequence of their out-of-school immersion in an electronic environment, students today sense global imperatives and problems: on television starving Biafran children are not greatly different from or more distant than starving Mississippian children; the Vietnamese are as near as the armchair to the set, and the Viet Cong, unlike the Japanese of the pre-TV, World War II comic books, will not suffer themselves to be made into the slant-eyed, snaggle-toothed enemies of old; one can see that pollution doesn't stop at the nearest border; that the moon is not a romantic symbol but something to explore; that the views of the Pope may need to harmonize with the powers of the Pill if man is to endure; that police are not always the Dick-and-Jane gentlemen who smilingly tell little lost children how to wend safely home; that white is not black.

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[1] Marshall H. McLuhan, "Address at Vision 65," *The American Scholar* (Spring 1966), p. 198.

[2] Committee for Economic Development, *Innovation in Education,* p. 42.

[3] John McHale, "Education for Real," *Dialogue on Education*, ed. Theobald, pp. 120-21.

In short, we seem to be living in a dimensionless world, one in which telephone, radio, TV, cinema, pictorial magazine, and newspaper sew a seamless web which envelops here and there, past and present, and converts them into a rapidly changing, perceivable and audible *now*, an omnipresent *now* that has been moving more quickly than teachers have been able to respond. As Peter Drucker notes in *The Age of Discontinuity:*

> . . . in the developed areas of the world school no longer is the access to a new world of experience. It no longer is the educator. It is rather a pinched and anemic substitute. The preschool child, even in the peasant cottage, is today introduced to the world through radio and television in a much more direct, more effective, more gripping manner than the most gifted schoolmaster could emulate. Whatever the contents of the electronic messages, in form and style they are expert, masterly, teaching, communicating.[4]

On the rapidity with which media have developed and influenced the growth of knowledge, Father Walter Ong of St. Louis University writes:

> Only after being on earth some 500,000 years (to take a fairly good working figure) did man move from his original oral culture, in which written records were unknown and unthought of, to literacy. The first script appeared around 3500 B.C. In another two thousand years the alphabet put in its appearance, around 1500 B.C. By the mid-1400's of the Christian era alphabetic letter press printing appeared in west central Europe. In another four hundred years the telegraph was devised. Within another sixty years, the wireless. Thirty-five years more brought television. A few decades later we had the whole panoply of spacecraft, Telstar, electronic computers in vast quantity, and countless related devices. Each advance exploited antecedently existing knowledge more efficiently than had the advance that went before, for new knowledge does not simply layer itself onto existing knowledge but interacts with it. It is not an additive but a multiplier.
>
> The total pattern of acceleration in knowledge is thus a complex one. Of itself, knowledge grows and accelerates its own growth. This growth also produces new media, which further accelerate growth (and of course change the structure of knowledge and of the psyche . . .). The new media themselves, finally, appear in an accelerat-

---

[4] Peter F. Drucker, *The Age of Discontinuity,* p. 336.

> ing sequence, more and more of them faster and faster as time moves on.[5]

Venn suggests that what we are witnessing as a consequence of the present rate of scientific activity is a change in *change*, an alteration new in man's history:

> The most significant aspect of the new technology is described by the word *change*. It is not simply a case of new sets of social and economic relationships replacing older ones, but of the new ones themselves being replaced at a faster and faster rate, with only those adapting to change surviving. This concept of change is not new; what *is* new is the *change in the rate* of change. This has come as a result of the tremendous increase in the rate of scientific activity; significantly, the *rate* of that increase is not constant, but *exponential*.[6]

If education is to survive as a viable institution in this society, then that survival is contingent at least in part upon the education received by the teacher to prepare him for his professional responsibilities in the world Ong and Venn describe. In his introduction to *Teaching in a World of Change,* Anderson reveals his awareness of the problem. After observing that the history of innovation in American education has not been a happy one for a variety of reasons, among them teachers' resistance to change, Anderson then goes on to claim that, as a nation, we have entered into a period of dramatic educational reform, one in which "it is essential that programs of teacher education prepare teachers for the schools of the future rather than for those of the past."[7]

What some of that preparation should be for prospective secondary teachers of English is the problem to which this study addresses itself.

Purposes of the Study

If those preparing secondary teachers are to prepare them adequately for many if not most of their professional responsibilities during their careers, two kinds of insight are imperative—insight into what changes external to formal education may occur in the future and alter education for better or worse, and insight into what changes may occur within education itself and have comparable effects.

Further, if those preparing the teachers are not to be so diffuse as to render worthless their insights into the future, they will need to be able to describe the anticipated occurrence of change within each subject field that the novice teachers intend to teach; for change in biology may so differ from change in history that it will impose upon teachers of biology not only new content to learn but new pedagogical responsibilities to assume.

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[5] Walter J. Ong, S. J., "Knowledge in Time," *Knowledge and the Future of Man,* ed. Ong, pp. 7-8.

[6] Grant Venn, *Man, Education, and Work,* p. 3.

[7] Robert H. Anderson, *Teaching in a World of Change,* p. v.

The purpose of this study, then, is twofold: first, to extrapolate from extant literature about the future those forces outside of education proper which may affect the future course of education directly or indirectly and to discuss briefly those forces; second, to determine from experts within the field of education what changes they anticipate within their disciplines and to relate these changes to the future responsibilities of secondary teachers of English. The study does not presume to tell those responsible for programs of teacher education what modifications to make in their present programs or how to make them; nevertheless, undergirding its immediate purpose is the hope that those who teach secondary teachers of English, through adjusting present programs in the light of the study's findings, can mitigate inertia in education by better preparing their students for change.

Though there exists a substantial and growing general literature about the future and a much lesser body of specific literature about the future of education, no study has heretofore attempted a long-range forecast of the responsibilities of teachers of a specific subject at a particular level of education. The substance of the study is derived from existing literature and from responses to questionnaires sent to eighty experts in educational psychology, secondary curriculum, educational media, and English. The presentation is speculative, descriptive, and, in part, analytical and inferential. Since empirical studies of the future are a contradiction in terms, the manuscript may lack the certitude in tone one often finds in reports of research based on a corpus of data rigorously tested in past time. It is hoped that this study, though it charts what may lie ahead rather than mines what lies behind, is nonetheless worthwhile.

Background of the Problem and Overview of Its Development

> If we are to avoid future disasters that could arise from misuse of our great powers to change environment, it is imperative to think of the world as a complex interrelated system in which a modification introduced anywhere produces, not only the effect immediately intended, but other effects that flow from the interactions within the system. . . .[8]

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[8] John T. Edsall, "Biology and Human Values," *Knowledge and the Future of Man*, ed. Ong, p. 175.

Need for future planning. One who contemplates studying the future broadly, or even the future of a single discipline, English, in a single institution, education, in a single nation, the United States, might justifiably be accused of suffering from a severe attack of hubris. For if one thing is apparent, it is that we live in an extremely complex age, one in which the behavior of one segment of the population can profoundly affect the behavior of other segments, one in which the behavior of one institution—home, church, school, court, business—or one nation—Russia, U.S., France, China—can favorably or adversely affect other institutions or other nations. Within fractions of seconds, satellites bring the world into our front rooms, while knowledge proliferates rapidly if not exponentially. Gone are the days in which one might confidently declare, as did Francis Bacon in 1592 in a letter to his uncle, Lord Burleigh, "I have taken all knowledge to be my province."

But hubris or no, not to attempt to anticipate change and thereby to guide its direction may be the greater sin of our age. According to Platt, man has entered a new age, one which marks the end of the billion-year-old era of natural selection. The future of the environment and of human evolution is dependent upon human decisions:

> From now on, the population of substantially every plant or animal, even in the remotest corners of the globe, will be increasingly determined by systematic human breeding or protection, or predation or pollution—that is, by conscious or unconscious human intervention. This generation marks the time when evolution by natural selection is replaced by evolution by human selection.
>
> And this human intervention is increasingly a conscious matter. The future of the environment, of the globe, and of the surrounding space is no longer being determined as it once was, by sudden and natural accident or by the accidents of construction of preexisting organisms, but rather more and more by human choices and actions. . . .[9]

Already for want of effective long-range planning, millions starve yearly; pollution contaminates sky and sea; natural resources are expended at a wastrel's pace; and city, county, state, and national governments create jurisdictional mazes affecting each other's provinces and precluding effective responses to crises.[10]

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[9] John R. Platt, "Life Where Science Flows," *Environment and Change*, ed. Ewald, p. 77.

[10] An editorial essay, "The Age in Perspective" (*Time*, Jan. 24, 1969), reported that, as of 1967, U.S. metropolitan areas were served by 20,745 local governments, the Philadelphia area alone having 876 separate municipal governments.

The creation of the Commission on the Year 2000, under the aegis of the American Academy of Arts and Sciences, is a result of the awareness that the society at present has "no adequate mechanisms to anticipate, plan for, guide, or 'invent' the future." The chairman of the Commission, Daniel Bell, goes on to say:

> In the last decade we have been overwhelmed by a number of fractious problems (Negro rights, poverty, pollution, urban sprawl, and so on) that, for lack of adequate foresight, have been dealt with in *ad hoc* and piecemeal fashion. Since the contours of these problems have had to be taken as "givens" (that is, the cities have sprawled, the baby bulge is already in the colleges), there has been little leeway in formulating adequate solutions. The questions, therefore, are whether we can identify sufficiently far in advance the nature of the emerging problems, whether we can indicate the kinds of data or knowledge necessary for the formulation of alternative solutions, and whether we can design new institutions or methods to cope with these problems.[11]

Students' dissatisfaction with education. Among institutions least amenable to those clarioning for change has been education. Reasons given for the dissatisfaction of students with their schooling are numerous and moot, but foremost among them is that education has not been responsive to the times, that it has been insufficiently concerned with moral implications of such present matters as war in Vietnam; racism within education and the society at large; hunger and deprivation within an affluent nation; the confluence of scholarship, industry, and the military in war research; and wanton disregard of the environment by industrial profiteers.

Brown argues that, because of contemporary forms of communication, students today are aware of societal lies; he believes that a rapprochement between generations will not occur until a drastic new approach to communication is attempted, one founded on the principle of truth:

> The society in which we live does not allow societal lies to go undetected and unexposed for long periods of time. Nevertheless, parents, teachers, and policy makers continue to subscribe to the conventional and insincere methods of communicating with the youth of today. This situation presents a ludicrous image of the older generation to the youth. When persons insist upon what is obviously hypocritical pontificating, observers cannot avoid drawing one of two conclusions: the proponents of the lies must be extremely naive or thoroughly dishonest. And I am quite certain that most of today's

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[11] Daniel Bell, "The Year 2000—The Trajectory of an Idea," *Daedalus* (Summer 1967), p. 653.

> youth forms one of these conclusions about the older generation at a very early age.[12]

That students' dissatisfaction with education can be and is being increasingly expressed in a diversity of ways, some of them violent, need not be documented here. Anyone who reads the morning paper, listens to radio, or watches TV news is familiar with recent student insurrections at such major universities as Columbia, California, Wisconsin, Harvard, Cornell, and Stanford. Nor does the Gallup Poll support the widespread belief that the dissatisfaction on campuses is felt solely by a minuscule percentage of hard-core militants or activists whose attitudes are considered reprehensible by the great majority of students. Instead, through personal interviews with 1,030 students in fifty-five colleges stratified to represent the national percentage of private, public, and denominational institutions, seventy-five representatives of the Gallup Poll found that though the majority strongly deplore violence, "students are in widespread agreement that they should have a greater say in the running of their colleges," including a greater say in the structure of courses, examinations, and class requirements.[13]

Further, the disaffection of students from formal education is not solely a phenomenon of higher education. *Life*, on the cover of its issue of May 16, 1969, printed in large red capitals "Collision Course in the High Schools," its six-word summation of findings from 2,500 interviews among students, parents, teachers, and principals of one hundred schools in large cities, suburbs, small towns, and rural areas. On page 24 of the same issue, pollster Louis Harris, under whose direction the interviews were conducted, comments:

> The key to what is going on among high school students today is that a majority clearly want to participate more in deciding their future. They are willing to abide by rules, but they will not abide by rules which put them down. They are aware of the need for authority, but not impressed by it for its own sake. They are excited by the prospect of living in a fast-changing modern society and they want their high school education to help prepare them for it—not for some society of the past.

Historical reasons for educational inertia. The failure of education to accommodate itself quickly to new priorities and imperatives is understandable. By tradition the college has been the conservator and disseminator of knowledge; only with the rise in the middle and late nineteenth century of the university has higher education regarded research, or the creation of new knowledge, one of its primary functions, a function which frequently has hindered if not prevented the maintenance of psychological and intellectual communion between professors and their students. Among moderns most critical of the effects single-minded pursuit of scholarship has had upon education is William Arrowsmith:

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[12] Claude Brown, "The Effective Society," *Environment and Change*, ed. Ewald, pp. 172-73.

[13] George Gallup, Jr., and John O. Davis III, "Student Majority Favors Goals of Militant Few," *San Francisco Chronicle*, May 26, 1969, p. 1E.

> By making education the slave of scholarship, the university has renounced its responsibility to human culture and its old, proud claim to possess, as educator and molder of men, an *ecumenical* function. It has disowned, in short, what teaching has always meant: a care and concern for the future of man, a Platonic love of the species, not for what it is, but what it might be. It is a momentous refusal. I do not exaggerate.[14]

Unable to separate itself from the undergraduate college, the university inherited what have increasingly come to be regarded as anachronistic traditions and responsibilities, among which is the tradition that the educational institution stands *in loco parentis* and is therefore responsible not only for providing students with such conveniences as adequate housing but for supervising their morals as well, morals which are not to deviate far from those found acceptable to the older generation as represented by trustees or regents, whose powers of governance were and are considerable. Too, through the creation of departments and the fragmentation of knowledge into disciplines, the universities created quasi-legal, economic, and intellectual bureaucracies which could not respond to "global" or interrelated problems swiftly and creatively.

Ralph Siu observes that "there are no universities, no graduate schools, and no academic departments dedicated to developing, refining, and imparting holistic techniques to prepare leaders for the new age"; what interdisciplinary approaches do exist he finds to be inadequate compromises in which solutions "are insipid statistical averages" and in which integration is attained by the partisan votes of teams of specialists and by compromise of definitions of terms.

> In the new age, deliberations will be centered around alternatives of wholes, not upon assemblages of alternate components which harmonize neither among themselves nor with the context of Nature. Technology needs to encourage our educational system to move in this

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[14] William Arrowsmith, "The Future of Teaching," *Campus 1980,* ed. Eurich, p. 118.

direction, to grow out of its own traditional ways of pedagogic alienation of intuitive integration.[15]

Finally, as the university grew away from the collegiate tradition of the liberal arts as the *sine qua non* of a gentleman's education and began to provide vocational education for the sons and daughters of farmers, mechanics, and tradesmen, its course offerings burgeoned, while many of its faculty became highly mobile, willingly hiring themselves out as consultants away from the campus at the expense of further loss of community between scholar and student and, perhaps more detrimental to avowed purposes of higher education, loss of critical objectivity on the affairs of society.[16]

The inability of secondary schools to respond quickly to, let alone anticipate and help direct, a rapidly changing society is more understandable yet.

Located in the communities from which their students come, subject to economic reprisals if local voters are dissatisfied with their performance, staffed by individuals who most often are products of middle-class backgrounds, required by law to provide moral guidance and to teach the evils of drugs and liquor if not dissidence, secondary schools are societal totems to the status quo.

Growth and costs of education. Compounding their difficulty in anticipating, responding to, and directing change within and outside of education has been the phenomenal growth of both secondary and higher education since the turn of the century, a growth which has required that vitality, which might otherwise have been expended elsewhere, be spent on responding to the immediacy of numbers—numbers of students expected, numbers of buildings needed, numbers of teachers required, numbers of dollars necessary. Citing the percentage of this growth, Coombs reports that from 1900 to 1967 the proportion of the age group attending secondary school increased from 12 to 90 percent and that the percentage of the corresponding age group enrolled in higher education increased from 4 to 44 percent.[17]

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[15] Ralph G. Siu, "Role of Technology in Creating the Environment Fifty Years Hence," *Environment and Change*, ed. Ewald, pp. 96-97.

[16] For a fuller discussion of the rise and functions of the modern university in America, see *The American College and University*, by Frederick Rudolph (Vintage Books, 1965); *Higher Education in Transition*, by John S. Brubacher and Willis Rudy (Harper & Brothers, 1958); *The Uses of the University*, by Clark Kerr (Harvard University Press, 1964).

[17] Philip H. Coombs, *The World Educational Crisis: A Systems Analysis*, p. 20.

From 1930 to 1966 alone enrollments in grades 9 to 12 rose from 4,812,000 to 13,000,000; in higher education, from 1,101,000 to 5,526,000.[18] From 1946 to 1965, the percentage of persons eighteen to twenty-one years of age enrolling in institutions of higher education rose from 22.1 to 45.6, an increase of over 100 percent in less than two decades.[19]

Nor will this growth subside in the near future, though the rate of increase, except for college enrollments, may be less dramatic than it has been in the past few decades. The U.S. Office of Education reports that the total enrollments "from kindergarten through graduate school in U.S. educational institutions increased from 38.1 million in 1955 to 55.9 million in 1966 and may increase to 62.2 million in 1976."[20]

In analyzing what he regards as a world educational crisis in which the "inner lines of force appear in all nations alike," Coombs contends that the words *change, adaptation*, and *disparity* suggest the nature of the crisis. He continues:

> Since 1945, all countries have undergone fantastically swift environmental changes, brought about by a number of concurrent world-wide revolutions—in science and technology, in economic and political affairs, in demographic and social structures. Educational systems have also grown and changed more rapidly than ever before. But they have adapted all too slowly to the faster pace of events on the move all around them. The consequent disparity—taking many forms—between educational systems and their environments is the essence of the world-wide crisis in education.[21]

Among the causes of this disparity, he believes the most important to be "the sharp increase in popular aspirations for education . . . the acute scarcity of resources . . . the inherent inertia of educational systems . . . and the inertia of societies themselves."[22]

However much the American public might be faulted for conservatively patrolling what should be taught its young, no one could accuse it of being niggardly of late in its financial support of education: the United States has spent more on education than on defense during the late 1960's. This despite a war in Vietnam.

> Education took annually about $70 to $75 billion of which $50 billion was spent by the school and university systems (public and private)

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[18] *Statistical Abstract of the United States: 1968*, p. 105.
[19] *Digest of Educational Statistics: 1967*, p. 69.
[20] *Health, Education, and Welfare Trends, 1966-67*, pp. 5-63.
[21] Coombs, *The World Educational Crisis*, p. 4.
[22] *Ibid.*

> and perhaps half as much again by industry, governments, and the armed forces for all kinds of schooling and training. This was twice what the United States had spent in a year in the mid-fifties, and four times the amount spent annually in the years after World War II when the "education explosion" first started.[23]

But public largess to education may be waning. School bond issues and tax increases for the schools are being voted down with increasing regularity. Reasons for public antipathy to the cost and performance of education are undoubtedly numerous, among them the seemingly measureless capacity of education to consume funds:

> . . . despite the staggering eight-fold increase in spending on elementary and secondary education over the last decade (to a total of $32 billion last year), the schools are still chronically underfunded. Moreover, the frustrated taxpayer, hounded by the federal surtax, rising local taxes and inflation, is taking his revenge in the only way left to him. In last November's elections, half of all school bond issues were voted down across the country, even though in one case it meant the schools had to shut down completely. This year the trend continues.[24]

Concern for increasing productivity of education. Unlike industry, which, in order to survive in a competitive marketplace, must anticipate and plan for change while simultaneously remaining conscious of cost controls, education invests little of its total budget in research and development. As a consequence, many of its critics accuse it of being impervious to public demands that it increase its productivity if it is to continue increasing its operational costs, the greatest percentage of which is budgeted to salaries.

The paucity of funds spent on educational research and development is noted by Coombs:

> There have been numerous and long-standing proposals to the effect that support for educational research and development should be at least 1 percent of total educational budgets. Yet the 1960 figure for the United States was only 0.12 percent and the 1965 figure 0.22 percent. By contrast, the more dynamic industries in the United States spend up to 10 percent of their turnover on research and development, to improve their products and production processes.[25]

To date, education has been what economists call a "labor intensive" industry, its major expenditure being for the salaries of teachers rather than for equipment. Consequently, if the unit costs of educating a student are not to increase annually with increases in teachers' salaries, then the productivity of teachers must increase through either a demonstrable improvement in the quality of students' educational performance or a demonstrable increase in the numbers of students taught, with no diminution in quality of their performance.

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[23] Drucker, *The Age of Discontinuity*, p. 311.

[24] Bayard Hooper, "The Task Is to Learn What Learning Is For," *Life*, May 16, 1969, p. 38.

[25] Coombs, *The World Educational Crisis*, p. 116.

The Research and Policy Committee of the CED has declared that, to augment productivity in education, the American school must be better organized for innovation and change, that there needs to be increasing emphasis on both basic and applied educational research and on the dissemination and practical application of that research, that school systems must continuously employ results of cost-benefit and cost-effectiveness analyses, and that there needs to be established a national Commission on Research, Innovation, and Evaluation in Education.[26] The Committee believes that "the expansion of research in education, though requiring a relatively high expenditure, will eventually yield, as it has in industry, a pay-out in terms of efficiency and productivity." [27]

Because of the need for education to improve its productivity, Drucker predicts its transformation within coming decades "by giant forces from without":

> It will be changed, first, because it is headed straight into a major economic crisis. It is not that we cannot afford the high costs of education; we cannot afford its low productivity. We must get results from the tremendous investment we are making. Concretely we are forced to do so by the fact that we cannot indefinitely increase the number of teachers. . . . No matter how much money we allot, if the supply of people is exhausted, more money will not buy more people. It will only bid up the price.[28]

Partially to increase the productivity of education as well as to operate more successfully in an age in which "knowledge has become the central economic resource," numerous book publishers and electronics industries have merged in recent years: [29] IBM purchased Science Research Associates; Raytheon Company acquired D. C. Heath; Xerox Corporation bought Ginn and Company, American

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[26] Committee for Economic Development, *Innovation*, p. 13. A similar recommendation was made by the President's Commission on Instructional Technology in its report *To Improve Learning: A Report to the President and the Congress of the United States* (Washington, D.C.: U.S. Government Printing Office, August 1969).

[27] *Ibid.*, p. 17.

[28] Drucker, *The Age of Discontinuity*, p. 334.

[29] *Ibid.*, p. 40.

Education Publications, and Basic Systems, Inc.; after purchasing Knopf, Random House merged with Radio Corporation of America; Sylvania Electric Products, Inc., and the Reader's Digest Association, Inc., formed a joint group to investigate the potential of electronic systems in education; and Time, Inc., and General Electric formed a subsidiary company, General Learning Corporation, with merged assets of $37.5 million and a former Assistant Secretary for Education, Francis I. Keppel, as its board chairman.

As yet, the consequences of these mergers have not been spectacular. Though one occasionally reads about an experiment in one school or another in the uses of computer-assisted instruction, and though one may read about and hear about the pedagogical virtues of "multimedia" systems of education, innovative uses of electronic media in the schools have been more rare than common. In October 1967 NEA polled 1,609 elementary and secondary teachers from across the nation and found only 3 percent had access to computer-assisted instruction and only 11 percent could use closed-circuit television. More than 80 percent, however, had access to filmstrip projectors, phonographs, and 16mm motion picture projectors.[30]

Educational inertia toward contemporary innovations. The reasons for the failure of newer media to take a firm hold in the schools are many; for computer-assisted instruction, the most oft-repeated reasons are that there exist insufficient "software" or meritorious instructional programs for computer "hardware" and that the cost of installing and maintaining a national system of computer-assisted instruction (CAI) would be exorbitant. More fundamental, however, to the lack of acceptance of all media other than books and of innovations in general are the inertia of schools as systems, and the inertia of teachers.

Let us briefly examine each of these reasons in turn:

Lack of "software." At present, 40 to 100 man-hours are required to program one hour of computerized instruction.[31] The programer must be familiar, as an author of textbooks need not be, with audio-visual methodology appropriate to displays on a cathode ray tube and with film and filmstrip, since the computer accommodates motion as the printed page does not.[32] Subjects that are most free from "attitudinal complexities"—mathematics, factual sciences, and languages if presented for denotative analysis—are most suited for presentation by computer.[33] Because of the length of time required to program an entire course, including time for testing, validation, and revision, the program may be obsolete from the standpoint of scholarship before its completion.[34] Computer languages, which range from relatively easy to quite complex, need to be known by the teacher or scholar if he is to make fullest use of the computer for his instructional strategies. At present, programers are not necessarily scholars or teachers, and scholars or teachers are not necessarily programers.[35] Finally, "courses written in one programing language for a given computer system are presently restricted to that system. . . . If CAI is ever to have an influence on education, courses will have to be compatible with many CAI systems so that good curricula can be used by anyone with adequate facilities." [36]

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[30] Loren C. Twyford, Jr., "Instructional Resources in the Classroom," *AV Communication Review* (Spring 1968), pp. 114-15.

[31] Ralph W. Gerard, "The New Computerized Shape of Education," *Inventing Education for the Future*, ed. Hirsch, pp. 111-12.

Costs. The Research and Policy Committee of the CED estimates that the cost of extending computer-assisted instruction to the 16,000 school systems attended by most of the nation's public school students would range from $9 billion to $24 billion a year, whereas the *total* public school expenditures for the United States during the 1967-1968 school year were estimated at $30 billion, including operational costs and capital expenditures.[37] Rent for terminals ranges from about $100 a month for a typewriter-like device to about $750 a month for a cathode ray tube (CRT) with keyboard and audio/visual units. Line charges, either on a toll call basis or on continuous service, depend upon the distance of terminals from computers.[38] In the near future, computer time may become less expensive as a consequence of increased production, miniaturization of circuitry, satellite and perhaps laser communication, time sharing,[39] and touch-tone telephone service.[40]

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[32] Gloria Silvern and Leonard Silvern, "Teaching a Graduate Level University Course in Methods of Computer-Assisted Instruction," *Automated Educational Systems*, ed. Haga, p. 285.

[33] I. A. Richards, Foreword, *The Computer in American Education*, ed. Bushnell and Allen, p. xxiv.

[34] J. Ronald Gentile, "The First Generation of Computer-Assisted Instructional Systems: An Evaluative Review," *AV Communication Review* (Spring 1967), pp. 31-32.

[35] *Ibid.*

[36] *Ibid.*, pp. 32-33.

[37] Committee for Economic Development, *Innovation*, pp. 66-68.

[38] John Caffrey and Charles J. Mosmann, *Computers on Campus*, pp. 169-70.

Inertia of schools. Raymond Callahan argues in *Education and the Cult of Efficiency* (Beacon, 1962) that until the turn of this century, most educational administrators were educational philosophers, not Manns or Deweys, but nevertheless men who were capable of articulating to the community the curriculum of the school on philosophical rather than economic grounds. However, with the growth of industry in the country and with taxation of industry providing the bulk of school revenues, superintendents of schools were increasingly called upon by industrialists and other businessmen to defend the curriculum primarily on the basis of its economic efficiency. The consequence was that elementary and secondary schools began to pattern themselves after industrial plants ("school plant" and "school plant planning" continue as educational jargon). Administrators came to stand in relationship to teachers as employers to employees; and, with the advent of the Carnegie Unit in 1908, students commenced moving along a pattern of courses requiring that they sit in rows for so many minutes a day for so many weeks for so many years. After being graduated they were commonly referred to as "products" of the institution.

The model of school as plant, with its assembly-line or lockstep processing of students, has been severely challenged by critics of education during the past decade. Among innovations suggested to alter these processes (as distinguished from altering the academic content of secondary education) have been team teaching; programed instruction, including CAI; nongraded instruction; flexible scheduling, including modular scheduling; elimination of bells; differentiated staffing of one form or another; learning centers and/or material resource centers which could serve a host of purposes, from providing a quiet place for independent study to being a catchall for tutorials, seminars, CAI, testing, film viewing, and record spinning.[41]

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[39] Harry F. Silberman, *Using Computers in Education: Some Problems and Solutions*, pp. 6-13.

[40] Donald L. Hahn, Richard A. Kaimann, and Peter P. McGraw, "Attendance Accounting: Yesterday, Today, Tomorrow," *Educational Data Processing: New Dimensions and Prospects*, ed. Kaimann and Marker, p. 165.

[41] For an overview of many of these recommended innovations, see *The New Media and Education: Their Impact on Society*, ed. Peter Rossi and Bruce Biddle (Doubleday Anchor, 1967); *Revolution in Teaching: New Theory, Technology, and Curricula*, and *Programs, Teachers, and Machines*, both edited by Alfred de Grazia and David A. Sohn (Bantam Books, 1962).

But old habits die hard, critics notwithstanding. In language true to the situation but overripe with metaphor and cliché, Goodlad denies that recent reform movements have had much effect on elementary or secondary schools:

> The much-heralded pedagogical revolution is still largely in the cumulo-nimbus clouds of educational reform that roll back and forth across this vast and varied land. These clouds have not yet enveloped the millions of teachers who make up the working force of our elementary and secondary schools to anything like the high degree claimed by many innovators and popular magazines . . . teaching is still largely a "telling" procedure . . . the processes of "discovery" and "inquiry" . . . seem not to be well understood. . . . The textbook dominates instruction. Films . . . are not woven into the fabric of the program. . . . The technological revolution has scarcely ruffled most classrooms; the computer is used for routine data processing in large school systems and for instructional purposes in only a handful of experimental laboratories.[42]

After reviewing the research of the late Paul Mort and his students, research that found that most school systems required fifty years to accept and implement a new idea, Meierhenry summarizes recent efforts to discover ways to reduce the lag between the known and the practiced. He concludes that education is now emulating the pattern for change in industry: "basic research followed by applied research and development and then field testing followed by widespread dissemination."[43]

However, as Meierhenry later observes, the greater the age of an institution, the more reluctant it is to change. Education has had sufficient time in this country to become highly institutionalized. Too, unlike an undiversified major industry, education has had a tradition of local autonomy and of dispersed leadership. Among groups cited by Meierhenry which affect educational decisions are lay boards, professional staffs, parents, and various professional and learned societies, not all in accord about the purposes of education. This myriad leadership, which does not include legislators or students—the two most vocal and perhaps most effective agents for change at present—leads Meierhenry to comment almost dolefully, "With so many different and often conflicting groups and agencies, it is perhaps surprising that any changes at all are made in an educational system."[44]

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[42] John Goodlad, "The Educational Program: To 1980 and Beyond," *Implications for Education,* No. 2, ed. Morphet and Ryan, p. 50.

[43] Wesley C. Meierhenry, "Innovation, Education, and Media," *AV Communication Review* (Winter 1966), pp. 461-62.

[44] *Ibid.,* pp. 463-64.

The inertia of teachers. Gentile, while acknowledging the present prohibitive costs of CAI for all uses except research, expects less expensive systems to be operable in the near future. It is the negative attitude of many teachers toward programed instruction, not costs, that he believes will be the more difficult obstacle to surmount. Teachers fear being displaced by the computer and by a new profession of "teaching engineers."[45] In similar vein, Carpenter warns against extensive use of teachers as performers on film, videotape, or other carriers. "It is a reasonable hypothesis that recordings of teachers, when injected into classrooms, threaten the teachers who must work directly with students."[46]

Howsam categorizes educational innovations into three groups: those that require only superficial changes in the teachers' behavior, e.g., using slides and filmstrips or overhead projectors; those that require basic changes in teacher behavior, e.g., teaching on a differentiated team or using a learning resources center; and those that are directed at improving teacher performance as such, e.g., giving up lecturing. He implies that a teacher will exhibit inertia toward an innovation in proportion to the degree of fundamental change that the innovation requires.[47] Similarly, Biddle and Rossi believe that media are likely to be adopted "if they support or slightly modify present educational practices rather than displace or change them." Less likely to be adopted are "media that imply a radical shift in educational roles or that require the creation of new positions or the retraining of personnel. . . ."[48]

That teachers have so far eschewed using media that would transform their roles is the conclusion of McCusker and Sorensen: "The essence of the educational process continues to be the relationships between individual teacher and pupil. . . . The effects of media in educational practice have been superficial and selective rather than fundamental and pervasive." The reason for this phenomenon is that no necessary bind exists between educational practices and educational research. "Teaching behavior seems to be singularly impervious to research findings about improved teaching methods."[49]

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[45] Gentile, "The First Generation," pp. 23-54.

[46] C. R. Carpenter, "Toward a Developed Technology of Instruction 1980," *Campus 1980: The Shape of the Future in American Higher Education,* ed. Eurich, p. 244.

[47] Robert B. Howsam, "Effecting Needed Changes in Education," *Designing Education for the Future,* No. 3: *Planning and Effecting Needed Changes in Education,* ed. Morphet and Ryan, p. 66.

[48] Peter H. Rossi and Bruce J. Biddle, eds., *The New Media and Education: Their Impact on Society,* p. 24.

Lindman attributes resistance to change to the "relatively long tenure of faculty members" whose early education "becomes obsolete before they are ready to retire." Even more significant, he believes, is their tendency to teach as they were taught and to think as their generation thinks.[50]

Whatever its causes, the inertia can be found in high school departments of English. In a recent national study of 116 departments selected for their superiority in producing NCTE Achievement Awards winners, Squire and Applebee found teachers not only lecturing more often to slow than to fast classes but using audiovisual equipment only 1.6 percent of instructional time; when nineteen experimental schools noted for their innovational programs were added to the study, the researchers found audiovisual equipment being used 7.1 percent of the time, a substantial but scarcely spectacular increase.[51] One may legitimately infer from the Squire-Applebee findings that access to audiovisual equipment and use of audiovisual equipment are not synonymous.

General Inadequacies of Current Programs in Teacher Education

The failure of teachers to make use of media other than books or to involve themselves in innovative programs or procedures is attributable partially to inadequacies of programs in teacher education. Few programs prepare teachers to make judicious use of available instructional media and materials; fewer yet prepare teachers for emerging professional responsibilities. In a strong indictment of present programs, Shaplin writes:

> Of the ninety institutions listed by the American Association of Colleges of Teacher Education as producing 400 or more new teachers a year (and some as many as 800, 1400, or 1600), few offer their prospective teachers the opportunity to study and analyze the new curriculum developments; few offer arrangements of content courses designed to facilitate understanding of curriculum developments; and only a minority offer arrangements of content courses designed to prac-

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[49] Henry F. McCusker, Jr., and Philip H. Sorensen, "The Economics of Education," *The New Media and Education,* ed. Rossi and Biddle, p. 207.

[50] Eric L. Lindman, "The School Administrator and Educational Innovation," *Inventing Education,* ed. Hirsch, p. 310.

[51] James R. Squire and Roger K. Applebee, *High School English Instruction Today,* p. 205.

> tice teach in situations where curriculum reforms are being implemented.[52]

Silvern and Silvern note that colleges now preparing teachers are preparing them for teaching in the twenty-first century, since few would reach retirement before the year 2000. Yet, "to the best of our knowledge, no teacher-training institution instructs in the methods of CAI, and a good many do not even offer courses on programmed instruction." [53]

Adelson believes that the impact of technology on educational planning and decision-making must be examined at many points since they are likely to remain highly decentralized and very distributed functions. One such point, he maintains, is the teacher-training institutions, "which 'produce' the people who will educate others for some time to come. If they prepare people for current roles and not for emerging ones, they simply harden the system against change." [54]

Margolin asserts that basic to a revolution in teaching "is the need for the introduction of CAI, dial access, and calculation facilities into the schools of education," these facilities to be a combined government-industrial effort "to introduce CAI on a large, well-funded basis." [55]

The Research and Policy Committee of the CED holds schools of education partially responsible for teachers' failure to integrate technical equipment into their courses:

> The error of the past has often been the failure to integrate the use of technical equipment into the basic planning of a course of study. This has been in part the fault of the schools of education, which too often have failed to educate teachers in the effective employment of audiovisual equipment and materials. . . . Valuable equipment often lies idle in school storage closets because its use as an educational instrument has not been understood or appreciated.[56]

In their review of research on instructional television, Chu and Schramm assert that teachers need to be taught how to employ television in their teaching and that they need to feel involved in planning its uses, for their attitudes toward the medium are reflected in students' attitudes. By becoming involved, the teacher's attitude toward the medium improves and he is "more likely to integrate the broadcast into an effective classroom situation—which will make both students and teachers like it better."[57]

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[52] Judson Shaplin, "Computer-Based Instruction and Curriculum Reform," *The Computer in American Education*, ed. Bushnell and Allen, p. 38.

[53] Silvern and Silvern, "Methods of Computer-Assisted Instruction," *Automated Educational Systems*, ed. Haga, p. 281.

[54] Marvin Adelson, *Decisions, Decisions, Decisions: Is Education Important Enough?* p. 6.

[55] Joseph B. Margolin, "Are We Building a Tower of Babel?" Reprint from *American Education* (November 1967).

[56] Committee for Economic Development, *Innovation*, pp. 42-43.

One must remember that departments of education are not solely responsible for the preservice education of a secondary teacher. Academic departments are primarily responsible for the inchoate teacher's knowledge of his subject and at least equally responsible for the teacher's attitudes toward innovation and change in education. If his subject-matter professors have lectured to him for four years, if they have shown no inclination to integrate into their teaching audio-visual instructional materials, if, as often seems to be the case, they have conveyed to the student their disrespect for the intellectual capacities and academic qualifications of professors of education, then one year of course work in the department of education understandably may have little positive, long-range influence on the teacher's attitudes or his performance.

Much evidence exists that the inertia found in secondary schools and in departments of education toward using educational technology or altering courses and programs of instruction can also be found in undergraduate and graduate academic departments. In 1963 a definitive survey of the uses of new media in higher education led Professor Lewis B. Mayhew of Stanford to conclude:

> With few exceptions, such as at Pennsylvania State University or the Chicago city junior colleges, college teaching seems to go on as always. . . . After the experiments have been completed and reports written, the matter too frequently is dropped or is reinterpreted so as to leave undisturbed the slow waltz of lecturing, testing, and grading which is the conduct of education.[58]

Inadequacies in Programs for Preparing Secondary Teachers of English

In 1961 the National Council of Teachers of English reported from a national survey conducted in 1960 that only 17 percent of departments of English required of prospective secondary teachers of English a course in modern English grammar, only 41 percent required of these students a course in advanced composition, and only

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[57] G. Chu and W. Schramm, *Learning from Television,* p. 72.

[58] Quoted in Judith Murphy and Ronald Gross, *Learning by Television,* p. 40.

51 percent a course in methods of teaching English.[59] In a summary of findings about the preparation of secondary teachers, the authors comment:

> The survey reveals that, insofar as required offerings are considered, the preparation of secondary teachers in literature is more adequate than is the preparation in language. The most notable deficiencies are in the areas of world literature and contemporary literature and in the apparent indifference of colleges to educating teachers in methods of literary criticism.[60]

Though the findings of the survey were given widespread publicity within the profession and though innumerable meetings within departments of English and within the profession at large were devoted to discussing the implications of these findings, by 1967 no dramatic changes had occurred in undergraduate English programs. From a survey that year of 300 undergraduate departments chosen randomly from the 1,320 offering four-year programs of English, Wilcox reported the following frequency of required courses for the major:

Survey, Masterworks	74.8%
Individual Authors	69.0
American Literature	61.0
Linguistics	39.0
Period Courses	37.6
"Other"	35.5
Early British Literature	34.5
Advanced Composition	29.0
Criticism	25.5
Genre Courses	22.1 [61]

Though Wilcox's percentages refer to courses for the student majoring in English rather than to those offered specifically for the prospective secondary teacher of English, one can nevertheless infer that by 1967 preparation in literature continued to be more than adequate and that, by the profession's own standards, preparation in language study, composition, and literary criticism was still inadequate for the majority of students preparing to teach English to adolescents. Too, unless one can read into the word "Other" the existence of courses in the film as an art or literary form, or courses in the oral tradition of literature featuring commercial and student-produced records and tapes, little was being done to acquaint students with the literary uses of media other than books.

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[59] Committee on the National Interest, *The National Interest and the Teaching of English*, p. 60.

[60] *Ibid.*, p. 86.

[61] Thomas W. Wilcox, "The Study of Undergraduate English Programs: Some Preliminary Findings," *College English* (March 1968), p. 447.

Wilcox noted that there was ample evidence of ferment and change in undergraduate programs, at least in the high percentage (87 percent) of departments declaring that they had recently inaugurated or were contemplating modifications in programs. Upon close inspection, however,

> . . . many of these innovations prove to be minor adjustments or reshufflings of familiar offerings. Although we have found individual instructors—even whole departments—who are experimenting with new methods for teaching the history of English literature, new genre and thematic courses, and new approaches to freshman studies we have not discovered any large curricular reforms which seem likely to sweep the nation.[62]

Too, Wilcox found the same notable deficiency in the area of world literature found seven years earlier by the authors of *The National Interest and the Teaching of English:*

> . . . our study reveals that only about a third of all departments offer or participate in interdisciplinary courses, only 37% contribute to general education programs, only 13% offer American studies programs and a mere 5% have programs in comparative literature. Academic provincialism is still common among us, and what innovation we do contemplate or accomplish is still limited to the traditional confines of our own discipline.[63]

In 1960, 51 percent of the departments required of prospective secondary teachers a course in methods of teaching English; in 1967 courses in teaching methods were being offered by 49 percent of all departments. The latter figure may be deceptive: offering a course and requiring it are not the same. Moreover, departments might not offer the course but might nevertheless require students to take it in the department of education.

In a survey conducted in 1962 of 576 institutions, Evans and Cardone found that approximately 200, or 33 percent, reported no separate course in English methods; and of these 200, only 42 indicated that English majors took even a general methods course. When the methods course in English was offered, it was sponsored by the department of English 26 percent of the time and by the department of education 50 percent of the time. It was cosponsored by both departments in a joint program 24 percent of the time.[64]

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[62] *Ibid.*, p. 448.
[63] *Ibid.*

Of greater pertinency is the fact that of those teaching the methods course in English only 10 percent had had a course in structural linguistics, only 24 percent a course in historical linguistics, only 16 percent a course in advanced composition, and only 17 percent a course in world literature.[65] When asked to describe or list what the methods course contained, 74 percent of the 188 instructors responding reported spending time in the course on the teaching of literature, while only 54 percent reported spending time on the teaching of grammar. One of eight (13 percent) said he devoted class time to current issues, trends, and innovations. Despite instructional problems teachers have in working with youngsters who speak and write nonstandard dialects, problems frequently reported by those teaching in urban schools, a meager 11 percent of the methods instructors included English usage as part of their course content, while only 3 percent reported spending instructional time on the use of audiovisual aids.[66]

In short, what is being described is an educational circularity which may account for the inertia shown by secondary teachers of English toward new media and innovative content and programs. The circularity is not surprising: those who teach methods courses in English have been taught, like the students before them, by teachers and professors of English, who in turn have been taught by teachers and professors of English. When secondary teachers begin their careers, they teach in the main as they have been taught, and they prepare their students to expect similar teaching in the college or university.

Recent Efforts to Reform Programs of Preparation for Secondary Teachers of English

Efforts are being made to intrude upon this circularity, to break what seems to be an ossified pattern, so that teachers will be better prepared not only to use educational resources available to them but to respond intelligently and creatively to educational innovations necessitated by the times.

Federal investment. Part of the thrust for improvement in education, including improvement in teacher preparation, has come from the federal government. From 1965 through 1968, the National Defense Education Act (NDEA) provided 400 summer institutes patterned after those sponsored in 1962 by the Commission on English of the College Entrance Examination Board, institutes that acquainted thousands of secondary teachers of English with modern scholarship in language and literary criticism. The Cooperative Research Branch of the USOE funded both conferences on needed research in English and twenty-six Curriculum Study and Demonstration Centers in English to devise new sequential material for the schools. Title VII of NDEA allotted millions of dollars for educational media research and dissemination. The Education Professions Development Act (EDPA) funded media institutes for secondary teachers of English. Title I of the Elementary and Secondary Education Act (ESEA) financed at district levels curriculum development to improve the academic achievement of disadvantaged students in large cities. In all, federal investment in education and manpower training has been considerable and should continue to rise to an estimated $8,129,000,000, or 4 percent of total budget outlays, by 1971. By comparison, in 1961 the investment was $1,499,000,000, or 1.5 percent of total budget outlays.[67]

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[64] William H. Evans and Michael J. Cardone, *Specialized Courses in Methods of Teaching English,* p. 3.

[65] *Ibid.,* p. 6.

[66] *Ibid.,* p. 11.

English Teacher Preparation Study. A more direct thrust to improve the preparation of elementary and secondary teachers of English has been the English Teacher Preparation Study (ETPS), a cooperative study by the National Association of State Directors of Teacher Education and Certification (NASDTEC), National Council of Teachers of English (NCTE), and Modern Language Association of America (MLA). With a grant of $172,214 from the Cooperative Research Program of the U.S. Office of Education, the study began in 1965; before its completion in 1967, twenty drafts of the Guidelines had been presented to thirteen association meetings, ten state meetings, four regional conferences, and a national conference, in twenty states and in Washington, D.C.[68]

After noting that thousands of college and university faculty members in English and education, state directors of teacher preparation and certification, school supervisors and administrators, and classroom teachers had participated in developing the Guidelines, James R. Squire, former Executive Secretary of NCTE, stated that the Guidelines represented "the culmination of the first phase of determined cooperative activity to improve the preparation of teachers in our schools."

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[67] *The Budget in Brief: Fiscal Year 1971*, p. 45.

[68] Michael F. Shugrue, "The History of ETPS," *English Journal* (April 1968), p. 525.

Squire then traced the background of the Study, a background rich with the efforts of individuals and groups to ameliorate the teaching of English in elementary and secondary classrooms:

> The antecedents of this project are many. They include more than a decade of effort by national and state committees to strengthen state certification requirements in English; they include the preparation of the volume on teacher education by the NCTE Commission on the Curriculum; they include the efforts of the National Commission on Teacher Education and Professional Standards to open a dialogue on teacher education between scholars and educators; they include the pioneer efforts of the Commission on English to introduce institutes in advanced study in English; they include the influential and highly significant institute program initiated by the United States Office of Education under authority initially provided by the National Defense Education Act; above all they include the continuing joint effort of the Modern Language Association of America and the National Council of Teachers of English, now working closely with the National Association of State Directors of Teacher Education and Certification and other organizations, to make possible a higher quality of education in English for children in our schools.[69]

Despite the efforts that went into them, the Guidelines were almost fated to disappoint some teachers. In conformity with decisions made at the first meeting of the Advisory Board of ETPS, the Guidelines, with the single exception of Guideline II, do not isolate the preparation in English of the elementary school teacher from that of the secondary school teacher of English. Further, the Guidelines are stated in terms of teacher competencies rather than in numbers of hours or lists of courses: e.g., Guideline I reads: "The teacher of English at any level should have personal qualities which will contribute to his success as a classroom teacher and should have a broad background in the liberal arts and sciences."[70] Sub-numerals and alphabetic letters delineate in considerable detail what those personal qualities and background are that the teacher should possess.

As a consequence of their wording, the Guidelines, according to John Fisher, Executive Secretary of MLA, were felt by some to be so general that they could not be effective, while others thought them to be unrealistically difficult. However, his experiences in conferences and meetings all over the country with hundreds of experienced individuals involved in the study persuaded Fisher that "any English department or any school system that will try honestly to plan a program in accord with these guidelines will 'professionalize' its teachers and thereby improve its English teaching to a striking degree." [71]

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[69] James R. Squire, "Introduction to the Guidelines," *English Journal* (April 1968), p. 479.

[70] "III English Teacher Preparation Study: Guidelines for the Preparation of Teachers of English—1968," *English Journal* (April 1968), p. 531.

In many respects the Guidelines are farseeing and, if implemented, would put an end to both the geographic and the academic provincialism decried by Wilcox and the inattention to nonbook media lamented by McLuhan and others. In the breakdown for each of the six Guidelines, one finds statements recommending the study of African, Asian, and Latin American literature; knowledge of at least one foreign language; familiarity with methods of teaching English to speakers of another language or dialect; study of philosophy, history, sociology, psychology, anthropology, and geography for what they contribute to the understanding of man, his languages, and his literature; ability to analyze and discuss language as it is used in various media and literature as it is presented in radio, television, motion pictures, and theater. The Guidelines also recommend that a teacher be proficient in oral reading of literature and in conducting choral reading and appropriate dramatic activities of all kinds. Additionally, the Guidelines assert that the teacher should know "how to create or find, evaluate, and use significant instructional materials from various media: texts of all kinds, films, kinescopes, tapes, records, slides, and programmed materials." [72]

According to its authors, the Guidelines are intended to suggest desirable competencies for teachers of English and should help state departments of education evaluate (a) programs of teacher education offered by institutions seeking accreditation and (b) individual applicants for certification. More important, however, is the intention of encouraging colleges and universities to develop sound programs to prepare teachers for elementary schools and teachers of English for secondary schools.[73]

How thoroughly the Guidelines will be implemented remains to be seen.

ISCPET. Still another thrust to improve the preparation of secondary teachers of English has been the Illinois State-Wide Curriculum Study Center in the Preparation of Secondary School English Teachers (ISCPET). Supported by funds supplied by the USOE, representatives from twenty institutions conducted a five-year study of ways to improve teacher preparation. After receiving recommendations from an advisory committee of twelve "nationally known persons in English, Speech, and Education," from Illinois authorities on certification, and from school administrators and teachers of English, the representatives, drawn from departments of English and education, prepared lists of qualifications under five headings: Knowledge of Language; Knowledge and Skill in Written Composition; Knowledge and Skill in Literature; Knowledge and Skill in Oral Communication; and Knowledge and Skill in the Teaching of English. Under each heading are three separate lists of qualifications: "minimal," "good," and "superior."

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[71] John Hurt Fisher, "The Importance of the Study," *English Journal* (April 1968), p. 550.

[72] "III English Teacher Preparation Study," *English Journal* (April 1968), pp. 531-36.

[73] *Ibid.*, p. 529.

As the headings might suggest, the lists are broadly worded and require much interpretation. Phrases such as "a basic knowledge of," "some knowledge of," "a wide knowledge of," "a thorough knowledge of," and "a relatively thorough knowledge of" abound. Nevertheless, the lists should provide helpful guidance to institutions wishing to develop instruments to evaluate directly the competencies of students who have completed programs and indirectly the qualities of the programs themselves.[74]

The Anglo-American Conference at Dartmouth. At a month-long meeting at Dartmouth College during the summer of 1966, fifty scholars and specialists in the teaching of English from the United Kingdom, Canada, and the United States called for a reform in the teaching of English in British and American schools. Highly critical of the emphasis being placed in the schools on literary history and literary criticism, participants placed emphasis on these items, among others:

> The centrality of pupils; exploring, extending, and shaping experiences in the English classroom.
>
> The urgency of developing classroom approaches stressing the vital, creative, dramatic involvement of children and young people in language experiences.

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[74] "IV Classic Statements on Teacher Preparation in English," *English Journal* (April 1968), pp. 546-49. Too, such ISCPET-sponsored studies as *American Dialects for English Teachers; Project Grammar: The Linguistic and Language Preparation of Secondary Teachers of English;* and *Advanced Composition in the Preparation of Secondary School English Teachers,* all published in 1969, provide substantial direction for those who wish to evaluate and improve their present programs. *What Every English Teacher Should Know,* published in 1970 for ISCPET by NCTE, presents recommendations under the same headings.

> The wisdom of providing young people at all levels with significant opportunities for the creative uses of language—creative dramatics, imaginative writing, improvisation, role playing, and similar activities.
>
> The need for radical reform in programs of teacher education, both pre-service and in-service.[75]

With its stress upon process rather than on content, upon the child and his creative linguistic development rather than on the teacher and his knowledge, the Anglo-American Conference challenged much of the philosophy that had shaped the development of institute programs and curriculum materials in English during the preceding decade.

Again, what long-range influence the Conference will have waits to be seen. If its influence is to be substantial, then programs of teacher education will have to be altered considerably: few teachers now in the schools and few being prepared for the schools have been taught to conduct classrooms in ways recommended by those at Dartmouth.

New standards for accreditation of teacher education. One additional effort to improve programs of teacher education should be noted: the new standards and evaluative criteria for the accreditation of teacher education, the consequence of a three-year project sponsored by the American Association of Colleges for Teacher Education. From an analysis of over 1,500 responses to questionnaires and of five regional conferences involving representatives from colleges and universities, specialized interest groups, state departments of education, and the profession, standards have been established for both basic and advanced programs. For basic programs preparing teachers through the baccalaureate, fifth-year, and Master's degree levels, there are standards for the program of instruction (general, specialized and professional); for the size, quality, preparation, and load of the faculty in teacher education; for the admission, selection, and involvement of the students in the professional program; and for resources and facilities for teacher education.

The new standards differ from the old ones in a number of ways: in their separation of basic and advanced programs (those beyond the M.A.); in their greater specificity; in the latitude given to patterns of organization and administration, in order to encourage innovation and experimentation; in their emphasis upon the quality of the faculty and of students admitted into programs; in the importance given to faculty involvement in elementary and secondary schools; in the emphasis given to joint participation of academic staff and teacher education staff in making decisions about programs; in the stress given to uses of educational technology and instructional media.[76]

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[75] *Ibid.*, pp. 549-50. For further information about the Dartmouth Conference see *The Uses of English*, by Herbert J. Muller (Holt, Rinehart and Winston, 1967), and *Growth through English*, by John Dixon (National Association for the Teaching of English, 1967).

The Study in Perspective

The present study, then, must be viewed against a backdrop of attempts in the past decade to improve the preservice preparation of secondary teachers of English. Unlike preceding projects, conferences, or studies concerned with improving that preparation, the present study specifically tries to assay what some of the responsibilities of the secondary teacher of English will be a decade, two decades, or three decades hence. Though it does not provide in every case answers for the queries it implicitly poses, it is concerned with questions such as these: What major developments over the next thirty years are anticipated by experts in English, and how would these developments affect the responsibilities of secondary teachers of English? What major developments are anticipated by experts in educational psychology, secondary curriculum, and educational media, and what bearing would developments in each of these fields have upon the responsibilities of secondary teachers of English? What context do the forecasts of forces outside of education provide for evaluating the forecasted responsibilities of secondary teachers of English? Finally, what changes in preservice programs of teacher education might need to be made in order to prepare secondary teachers of English for emerging responsibilities?

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[76] *Standards and Evaluative Criteria for the Accreditation of Teacher Education.*

CHAPTER 2

METHODOLOGY

Rescher succinctly states that at present there are basically three types of predictive methodology: "The extrapolation of historical experience, the utilization of analytical models, and the use of experts as forecasters."[1] The third type was used for this study. Developed by Helmer and colleagues at RAND Corporation, the *Delphi technique* polls the opinions of experts, usually through a sequence of questionnaires. The technique was chosen for a variety of reasons: assembling experts for a conference would be far more expensive than would be mailing questionnaires to them; the technique employs no a priori judgments about the shape of the future—questionnaires are structured from the responses of the experts, not from the intuitions of the researcher. Between mailings, experts have time to reflect upon their previous responses and, in subsequent mailings, to alter them; deadlines for returning questionnaires can be sufficiently generous that experts are not pressured into making "shotgun" responses such as those sometimes heard at roundtable or panel discussions; because of the anonymity of the experts to each other and because of the absence of oral polemics and rhetorical stances, the technique, though not free from persuasive devices, seems less contaminated by them than are forecasting techniques which bring experts together in face-to-face discussions; in a tension-free atmosphere, experts can best profit from each other's intuitions.

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[1] Nicholas Rescher, *The Future as an Object of Research,* p. 5. For a detailed discussion of the history of technological forecasting, its present techniques, organizations, and activities, see Erich Jantsch, *Technological Forecasting in Perspective* (Paris: Organization for Economic Co-operation and Development, 1967). For a list of pitfalls of forecasting as well as objectives which might be accomplished through future-oriented policy research, see Herman Kahn and Anthony J. Wiener, *The Year 2000: A Framework for Speculation on the Next Thirty-three Years* (New York: Macmillan Co., 1967) pp. 389, 398-99. For a fuller discussion than that provided here of the development and uses of the Delphi technique, see Olaf Helmer, *Social Technology* (New York: Basic Books, Inc., 1966) and *Analysis of the Future: The Delphi Method* (Santa Monica: RAND Corporation, March 1967).

Selection of Experts

The first problem was to decide what areas of expertise should be polled in forecasting the responsibilities of secondary teachers of English; the second problem was to determine how to judiciously select experts within these areas.

Learning theory, educational technology, and secondary curriculum were chosen because of their continuing influence on the performance and responsibilities of secondary teachers of English. How students learn, how they transfer learning, how their linguistic repertoires develop, how affective and cognitive learnings complement and differ from each other—such knowledge is essential to the teacher of English. Likewise, the performance of the teacher of English should be influenced by which media—book, film, record, tape, slide, TV, lecture, discussion, tutorial—are most appropriate to particular students' learning particular skills, attitudes, or content. The responsibilities of the teacher of English are also determined in part by the work of experts in secondary curriculum, who in the past decade have advocated such innovations to the structure of the curriculum as team teaching, modular scheduling, nongraded instruction, CAI, and elective programs. Finally and most obviously, how the secondary teacher of English perceives his responsibilities will be a consequence of how experts within his field perceive those responsibilities—teachers of methods, linguists, literary scholars, scholars of the mass media, learned advocates of creative uses of drama, and rhetoricians, among them.

Mailing Schedules. In January 1969, a letter introducing the author, describing the nature of the study, and requesting the participation of the recipient was sent to 166 experts. To encourage cooperation, participants Gagné, Edwards, Hatfield, and Hogan personally signed letters to experts they had selected within their fields. To each of the 100 who indicated a willingness to cooperate, a letter was sent on February 1, 1969, requesting him to list the major developments he anticipated in his field during the next three decades, developments which had a reasonable chance of occurring and of altering the behavior and responsibilities of secondary teachers.

Upon receipt of the letter, seven participants asked to withdraw from the study, one because he believed the enterprise too speculative, another because he was too busy to write the lengthy essay he believed such a request necessitated, another because all he had to say about the future could be found in his published works. Thirty-five never responded to the letter.

Anticipated developments were excised from the responses and listed on the first structured questionnaire, mailed on March 7, 1969.

Similar or identical developments were occasionally listed on more than one questionnaire because experts on different panels had independently submitted them and because the time of their being widely implemented might be perceived differently by members of separate panels. Directions invited panelists to clarify items that appeared to misrepresent their views and encouraged them to list on a sheet accompanying the questionnaire any important potential developments that had been overlooked.

Since large departments of education normally find it uneconomical to invest instructional time and library and building resources to preservice programs of teacher education that prepare small numbers of teachers for special programs, participants were asked to indicate the probability of at least 20 percent of the student population or the educational programs of 20 percent of the secondary schools being affected by a development within each of six five-year time periods from 1970 to 2000. (Student population was separated from educational programs in secondary schools for two reasons: to accommodate any who might believe that schools as we know them will not persist for another three decades, and to allow for the forecast of developments educational in nature but outside the purview of schools.) Participants were also asked to bear in mind the possibility that some developments may wane in importance, e.g., 80 percent probability of implementation in 1970-1979, 60 percent in 1980-1984, and 20 percent in 1985-1989.

Asking the experts to indicate the probability of 20 percent implementation of a development was perhaps a mistake: by forcing them to give a percentage of a percentage (e.g., 70 percent probability of 20 percent implementation), the directions may have led participants to be too conservative—one probably cannot help feeling temerarious in writing 100 percent probability, even if that 100 percent probability refers to a development's affecting only 20 percent. Too, the directions were unnecessarily confusing, as evidenced by the handful of experts who chose to ignore them and placed check marks rather than percentages within time periods. Had the directions merely asked for the percentage of the student population or of educational programs that would be affected by a listed innovation within each time period, the initial intention could have been realized: if the percentage fell below 20, large departments of education could then choose to ignore the innovation in their preservice programs.

Of the hundred who received the second questionnaire (the first structured one) seventy, or 70 percent, responded. Among those who completed the questionnaire were twenty-one who had failed to reply to the preceding letter requesting them to list important developments anticipated in their field during the next thirty years. Any expert who had indicated a willingness to participate in the study was retained for the first two rounds. If he failed to respond in either round, he was then eliminated. After the second round, the names of twenty experts were therefore deleted from the study, leaving a total of eighty who participated in one or more rounds.

Table 1

Percentage of Responses to Questionnaire 2

Questionnaires Sent	*Responses* *No.*	*%*	*Withdrawals* *No.*	*%*	*No Response* *No.*	*%*
Educational Psychology						
23	18	78	0	0	5	22
Secondary Curriculum						
24	18	75	1	5	5	20
Educational Media						
27	18	67	2	7	7	26
English						
26	16	61.5	1	4	9	34.5

On April 17, 1969, the third questionnaire, composed of new and clarified items, was mailed to the eighty remaining participants, of whom fifty-four, or 67.5 percent, responded. Following the questionnaire itself was a request that the panelist, in the light of his present intuitions, list those changes in preservice programs of teacher education that he believed necessary for preparing teachers for the future. The request elicited fifty suggestions for changes in current programs, suggestions which were incorporated in the fourth questionnaire.

On May 22, 1969, the fourth questionnaire was sent to the panel on English. This questionnaire was composed of items found by computer analysis to have at least a 40 percent chance of 20 percent implementation at some time during the next three decades. In addition, the questionnaire contained the list of changes in preservice programs in

Table 2

Percentage of Responses to Questionnaire 3

Questionnaires	*Responses*		*Withdrawals*		*No Response*	
Sent	*No.*	*%*	*No.*	*%*	*No.*	*%*
Educational Psychology						
19	12	63	0	0	7	37
Secondary Curriculum						
20	13	65	0	0	7	35
Educational Media						
21	17	81	1	6	3	13
English						
20	12	60	0	0	8	40

teacher education suggested by members of all panels. The experts in English were asked to indicate for each item, assuming its implementation, the extent to which it would affect the responsibilities and behavior of secondary teachers of English; i.e., would it have *considerable, some,* or *virtually no bearing* on the performance of the teacher? Additionally, the experts were asked whether, in a preservice program to prepare secondary teachers of English for the future, each suggested change from present programs was *necessary; desirable but not necessary;* or *neither desirable nor necessary.*

Of twenty questionnaires sent to panelists in English, seventeen, or 85 percent, were returned.

Analysis of Responses

The study produced an unwieldy amount of information. Altogether, the first two structured questionnaires contained over 200 items, 132 of which were found to have 40 percent or better chance

Table 3

Percentage of Responses to Questionnaire 4

	Questionnaires	*Responses*		*No Response*	
	Sent	*No.*	*%*	*No.*	*%*
English					
	20	17	85	3	15

of affecting at least one-fifth of the instructional programs or the student population of the secondary schools. Since the implementation for each item was distributed into six five-year time periods, each of which required analysis for percentage of probability, 1,200 discrete pieces of information had to be analyzed. Too, to establish the degree of confidence in the forecast of a development, each panelist was asked to indicate on a 1 to 4 scale the extent to which he believed himself informed about an item—(1) *very knowledgeable*, (2) *knowledgeable*, (3) *not well informed*, (4) *poorly informed*. This scale necessitated weighting responses to each item by computer program BMDO2D. Further, the last questionnaire, which went only to the panel on English, contained 182 items requiring an analysis different from that used for preceding questionnaires. Almost overwhelming is the problem of presenting in any coherent way this much information to a reader, particularly since no statistical procedure for reduction of data appeared applicable.

Consequently, though computer program BMDO2D revealed not only the mean probability of a development's being implemented in each time period but the standard deviation within each period as well, the latter figures are not presented. Also presented are the mean degree of expertise for each item. A separate chapter is given to discussing the forecasts of each panel, with no attempt being made to discuss in depth each item on each questionnaire. Instead, generalizations about and inferences from the findings are made.

The Delphi technique was modified for the study in a number of ways: while Helmer in the RAND Forecasting Study asked panelists to situate the 50-50 probability of realization of an item in one of a number of time periods into which the next fifty years had been divided, this study was concerned with implementation rather than realization of an innovation during the next thirty, not fifty, years. Too, while Helmer encouraged panelists to respond to all questionnaires, including those in areas for which the panelists might lack expertise, no real encouragement was offered in this study. Though all panelists received all questionnaires in order that they could benefit from each other's insights and more clearly follow the direction of the study, questionnaires for panels on which the expert was not included were mailed to him approximately one week after he had received the questionnaire for the panel to which he belonged. For questionnaires possibly outside his province of expertise, he was invited to respond only to those items about which he considered himself knowledgeable. Moreover, while Helmer did not ask panelists to rate themselves on their knowledge about items to which they responded—an oversight about which he has expressed regret—self-rating for expertise accompanied each item on Questionnaires 2 and 3 of the present study. Finally, while Helmer asked dissenters (those outside the interquartile range of predictions about the time when an item would be realized) to indicate reasons for their dissent, hoping thereby to narrow the range of disagreement in subsequent rounds, a comparable attempt to achieve consensus was not made in this study. The shorter span of time for which to forecast (thirty rather than fifty years), the concern for implementation rather than realization, the self-rating for expertise, and the intentional failure to encourage experts to forecast in fields about which they might be poorly informed—all seemed to preclude the necessity of trying to achieve greater accord among participants than the structure of the study would already provide.

Although no strong encouragement was offered participants to forecast in areas about which they might not be well informed, a considerable number of panelists nonetheless contributed their time and insights to questionnaires for panels of which they were not members. Their responses, though they might be proven in time to be more accurate than those of members of the panels themselves, were not included in the study for fear of contaminating data. A separate study may later be made to compare the responses of members and nonmembers of panels. Obviously, as is apparent from an examination of the questionnaires, members of different panels often submitted similar or identical items as future developments within their fields which would affect secondary education: expertise among educators sharing many of the same concerns is not always so narrowly confined as this study implies it to be.

In any study employing experts' intuitions about the future, one may of course unwittingly undervalue the foresight of an expert who, possessing information and insights his colleagues lack, makes forecasts widely at variance from theirs. In a society, however, in which information is quickly communicated and shared among intellectuals having similar scholarly or professional interests, the risk is slight of burying the sterling intuitions of the one under the worthless conjectures of the many.

Use of Secondary Sources

Because of the desire to present forecasted changes in secondary education in the context of forecasted alterations in other institutions and forces in the society which could affect and/or effect educational change, a considerable number of future studies were perused. Particularly helpful in guiding this novice in the field of forecasting to studies which supplemented and enriched his own were bibliographies published by RAND Corporation on long-range forecasting and future computer technology (SB-1019, July 1968) and on automation, technological change, and studies of the future (P-3365-3, March 1968). *The Futurist*, a journal of forecasts, trends, and ideas about the future published by the World Future Society, provided valuable reviews and annotated bibliographies of future studies. The briefly annotated bibliography in Jantsch's *Technological Forecasting in Perspective* was of considerable assistance in that it was divided into eleven broad subject categories, ranging from "Fundamental Science and Technology (General)" to "Utopia and Science Fiction." Bibliographies accompanying works that were read were also consulted for aid in selecting still other works. Finally, eighteen years of experience in teaching and studying secondary English and methods of teaching secondary English were invaluable resources for the books, the trends, the issues, and the people they brought to mind.

Conclusions and Implications

The study was ambitious, taking on at times what seemed to be the dimensions of an Institute for the Study of the Future rather than the more modest shape of a doctoral dissertation. The problem of how to present most thoroughly, clearly, and readably the information accumulated has not been satisfactorily solved.

The Delphi technique itself proved a useful method of garnering the opinions of numerous gifted individuals, though the technique is not without its problems: experts are a mobile group (responses, e.g., were received from Geneva, Paris and Barbados, as well as from secretaries reporting that responses would not be forthcoming because of out-of-the-country junkets of panelists); they are a busy group, apt not to heed a doctoral candidate's ambitious deadlines—more than once a questionnaire, hastened via air mail and special delivery, was received from a participant a month after a deadline had been reached and data had been analyzed; and they are an articulate group, bothered by the seemingly inevitable ambiguity that insinuates itself into one item or another of a questionnaire. That as many of these able people participated as did is a tribute both to the concern they have for the future of education and to the regard they hold for their colleagues who signed the letters asking them to participate in the study.

CHAPTER 3

GLIMPSES: PRESENTS AND PROSPECTS I

Obviously two chapters of a monograph cannot do the contextual mapping necessary to place in full perspective either secondary education or the responsibilities and behavior of secondary teachers of English during the next thirty years. All they can do is sketch briefly those changes which may occur in institutions or in societal forces that could determine in whole or part the future course of education. Since what is being sketched are segments of possible futures, one may occasionally find that the description of a particular segment either overlaps or is somewhat incompatible with the description of another segment. Again, the reader needs to be reminded that the future will be composed of interacting and overlapping processes but that it is not a fixed and waiting entity: it will be in good part what he and others make it. This and the next chapter examine some movements that now appear almost inexorable as well as some whose development and direction are clearly open to choice.

For a fuller examination of forecasts of the future, the reader is urged to read works cited in the bibliography. Of more immediate importance is that he bear in mind as he reads chapters 5, 6, 7, and 8, containing the forecasts of the four panels, the brief description in this and the next chapter of dimensions of the future that may help bring to fruition the experts' forecasts or help render them fruitless.

Population

Because its growth makes demands on forms of communication, educational facilities, welfare programs, legal agencies, human resources, foodstuffs, air, water, lumber, minerals, and synthetics; because its growth affects utilization of space and pollution of the environment; because its growth may culminate in a catastrophic war between the "haves" and "have-nots"—the Western developed nations, populated mainly by those of Northern European descent, and the developing nations, composed of blacks, Asians, and Latins of mixed ancestry—population is the single problem of greatest consequence for man's future.

Kahn and Wiener note that from 8000 B.C. to 1650 A.D. world population grew at a rate of 50 percent each thousand years, but that from 1650 to 1965 the rate of millennial growth was 2,000 percent, or forty times greater in the modern age than in the premodern.[1] Hauser reports that in 1966 the United Nations issued population projections to the end of the century, indicating that if present high fertility and declining mortality rates continue, world population will reach 7.5 billion by 2000.

> On the contrary supposition that the birth rate *declined* along with the mortality rate, the U.N. calculated three additional projections, termed high, low, and medium variants. The high variant gives a world population in 2000 of 7 billion, the medium variant of 6.1 billion, and the low 5.4 billion.[2]

As late as July 1969, the higher figure was being quoted by scientists as the more likely figure unless methods of birth control other than condoms, oral pills, and intrauterine devices are developed soon.[3]

World projections to 2018 produce a medium estimate of 9.7 billion, a high of 10.4 billion, and a low of 8.5 billion. In the fifty years from 1968 to 2018, population according to these projections will increase between 5.2 and 7.1 billion, with the medium increase 6.4 billion—an increase over one and one-half times greater than the present total population of the world.[4]

To feed modestly the population of underdeveloped countries will require by the end of the century an increase in present food supplies of 306 percent in the Far East, 207 percent in the Mideast, 238 percent in Latin America, and 159 percent in Africa. "By contrast, food production in these areas as a whole rose 54 percent during the past 25 years."[5]

Although advanced farming techniques may provide by the year 2000 a grain-based diet adequate to sustain the populations of underdeveloped countries,[6] large-scale starvation is nevertheless imminent unless birth rates become lower than, or at the most equal to, mortality rates. Ehrlich predicts massive starvation in South America, Asia, and Africa as early as 1985 because of failure to plan early and adequately for the consequences of population rises in these areas.[7] Nor can one be sanguine at present about the economic feasibility of "farming" the already contaminated oceans: as Ehrlich points out, the protein derived from eating fish is far less than the protein necessary for growing fish.[8] Also economically unfeasible is the desalination of sea water for irrigating deserts: pumping water uphill from sea level to arid land is prohibitively expensive.

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[1] Herman Kahn and Anthony J. Wiener, *The Year 2000*, p. 150.

[2] Philip M. Hauser, "Population: The World's People Will Nearly Triple in Number," *Toward the Year 2018*, ed. Foreign Policy Association, pp. 136-37.

[3] "U.S. Moves on Pill for Males," *San Francisco Chronicle*, July 2, 1969, p. 1.

[4] Hauser, "Population," p. 139.

[5] *Wall Street Journal* Staff, *Here Comes Tomorrow: Living and Working in the Year 2000*, p. 15.

The population in developing countries of those under fifteen years old, now 50 percent of the population of these countries, is predicted to equal by 1975 the total population of the developed world. However, existence of this youthful, dependent population, as Michael observes, is problematical: hundreds of millions of children may be killed by famine and epidemics, in which case "we will face additional ethical as well as operational complexities."[9]

Following suggestions made by William and Paul Paddock, authors of *Famine-1975!* (Boston: Little, Brown & Co., 1967), Ehrlich recommends as one way of facing those ethical and operational complexities that we make now a tripartition of the underdeveloped nations—those that face economic disaster and massive starvation even with our help, those that will eventually manage without our help, and those that can avoid decimation of their population only with our aid. These latter nations, and no others, should receive our economic largess.[10]

Even though there is no immediate danger that the United States will experience famine or a decrease in standard of living because of its increasing population, Dubos maintains we nevertheless suffer from overpopulation "because human life is affected by determinants that transcend technology and economics":

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6. T. Gordon, *The Future*, p. 20. For a description of recent dramatic increases in the yield per acre of corn, wheat, rice, and potatoes in developing countries, see H. Gilliam, "For the Starving Millions, Seeds of Hope," *This World*, supplement to *San Francisco Examiner and Chronicle*, Dec. 22, 1968; "The Hope of Conquering Hunger," *Time*, Jan. 31, 1969, pp. 21-22; and Lester R. Brown, "The Optimistic Outlook for World Food Production," *The Futurist* (August 1969), pp. 89-93.

7. Paul R. Ehrlich, *The Population Bomb*, pp. 17-45.

8. *Ibid.*, p. 101.

9. Donald N. Michael, *The Unprepared Society*, pp. 14-15.

10. Ehrlich, *The Population Bomb*, pp. 159-65.

> Unwittingly we tend to regard ourselves and our fellow men as things, rather than as human beings. We do not recognize any danger in crowding as long as we can produce enough food for physical growth and enough goods for economic growth. Yet overpopulation can destroy the quality of human life through many mechanisms such as traffic jams, water shortages, and environmental pollution; spreading urban and suburban blight; deterioration in professional and social services; destruction of beaches, parks, and other recreational facilities; restrictions on personal freedom owing to the increased need for central controls; the narrowing of horizons as classes and ethnic groups become more segregated, with the attendant deepening of racial tensions.[11]

To change the outlook for world population and economic disaster for many nations would require a major reallocation of present world resources combined with a program of economic development and population control, a prospect not yet in sight, according to Hauser. Moreover, even if we had sufficient funds to undertake such a massive task, it is doubtful, says Hauser, that we know as yet how to expend the monies to adequate effect. Consequently, he believes that the next half century will be characterized by increased social unrest, greater political instabilities, intensified cold war between both capitalist and communist blocs and have and have-not nations, greater military expenditures, higher taxes, and larger government in the United States.

> Given the present outlook, only the faithful who believe in miracles from heaven, the optimistic who anticipate superwonders from science, the parochial fortunate who think they can continue to exist on islands of affluence in a sea of world poverty, and the naive who anticipate nothing can look to the future with equanimity.[12]

Violence, Weaponry, and War

In January 1964, the median estimation for a major war within ten years made by experts participating in the RAND Long-Range Forecasting Study was 10 percent; for war within twenty-five years, the median estimation was 20 percent. The relative probabilities for modes of outbreak were (1) advertence, 11 percent; (2) escalation of a political crisis, 45 percent; (3) escalation in the level of violence in an ongoing minor war, 37 percent; (4) surprise attack at a time when there is no ostensible acute crisis, 7 percent.[13]

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[11] Rene Dubos, "Man Adapting: His Limitations and Potentialities," *Environment for Man*, ed. Ewald, p. 21.

[12] Hauser, "Population," pp. 142-43.

[13] Olaf Helmer, *Social Technology*, p. 68.

Kahn and Wiener, though discounting high probability estimates of nuclear war occurring by 2000, nevertheless declare that "it would be absurd and dangerous to ignore the possibilities of major war, depression, violent new political movements or even of more unpleasant developments."[14] Gordon observes that the dilemma of our age is that

> war is feasible from a technical viewpoint, occasionally impending from a political viewpoint, and unthinkable from a moral, ethical, and genetic viewpoint. War is possible. War is conceivable. Even nuclear war. . . .[15]

As many as fifty nations could be producing nuclear weapons of their own within a decade or two. If they do not actually build bombs, it will be primarily because of political and diplomatic considerations, with economic concerns remaining a secondary factor for many countries.[16] Technologists will continue to invent ever more radical weapons,

> and they will invent them at a pace that will make the technological revolutions of recent years seem tame and slow. This in itself will pose problems for international diplomacy and peace—and, indeed, will do so if for no other reason than that the changes will outpace our ability to understand them.[17]

The possibility of international race war is serious. Because of modern forms of communication, human beings in Africa, Asia, the Middle East, and South America show an increasing awareness of the disparity between their incomes and modes of living and those enjoyed by citizens of affluent nations. Drucker dismisses any notion that North Americans, Western Europeans, and Japanese will be virtually idle by the year 2000 and enjoying a standard of living many times that of today:

> This, bluntly, cannot happen. One-third of a community cannot live in idle luxury while two-thirds toil eighty hours a week to gain the merest subsistence. It cannot happen when everybody knows how his neighbor lives. It cannot happen in the Global Shopping Center the world economy has become. One way or another the rich will be stopped from becoming ever richer while the poor at best remain where they are. One obvious way to prevent this is war. . . .[18]

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[14] Kahn and Wiener, *The Year 2000*, p. 316.

[15] Gordon, *The Future*, pp. 35-36.

[16] D. G. Brennan, "Weaponry: Disintegrator Rays Likely Will Be 'Conventional' Weapons, but Warfare Possibly Will Be Bloodless," *Toward the Year 2018*, ed. Foreign Policy Association, p. 20.

[17] *Ibid.*, pp. 21-22.

[18] Peter F. Drucker, *The Age of Discontinuity*, pp. 104-105.

The fissure between rich (largely white) and poor (largely colored) nations must be eliminated through restoration of the nineteenth-century capacity for development—only under quite different conditions—or, claims Drucker, "the twentieth century will make true, as Mao and Castro expect, the prophecy of class war. . . . Only the war would now be between races rather than classes." [19]

Myrdal is another who fears an international race war. First noting that all of the rich nations are white or predominantly white, while almost all poor nations are nonwhite, he then observes that in the world as a whole, most people are nonwhite and poor, while the minority of the well-off are mostly white. These observations lead him to fear "more than anything else" the infusion of the race issue in the international class struggle:

> A sign that should make us aware of that danger is that so often at meetings of representatives from the poor countries, in the resolutions adopted against "colonialism" "and imperialism" we also find the word "racism" as something they protest against.[20]

Contributing to international violence and the possibilities of major race and/or class wars is the present trade in arms, for which the United States is the world's largest merchant. George Thayer, author of *The War Business* (Simon & Schuster, 1969), claims that between 1950 and 1966 the U.S. funneled $50 billion worth of armaments into the world market, either selling or giving away during that period 9,300 jet fighters, 2,496 naval craft, 19,827 tanks, 82,496 submachine guns, 30,688 mortars, 31,360 assorted missiles, and billions of rounds of ammunition and explosives. Thayer advocates arms control which would prevent major world powers from selling to the poor nations.[21]

Not to be lightly dismissed is the possibility of a major revolution in the United States within the next thirty years. The militancy on college campuses of groups like SDS and BSU, the increasing violence in secondary schools, the frequency of riots within ghettos, the growth of the underground press, the alliance of some groups of students with the teachings of Mao or Lenin, the national growth of the Black Panther Party, the popularity among some blacks of the works of Frantz Fanon, the folk heroism of Che Guevera among the young, the current rhetoric of violence and polarization—"The People," "off the pigs," "by any means possible," "non-negotiable demands," "up against the wall"—all may be indices of future major revolution. At the least, they are signs of dissent within the society that will not be readily quelled in the immediate future, even with the repressive police-state measures advocated by reactionary individuals and groups.

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[19] *Ibid.*, p. x.

[20] G. Myrdal, "The Necessity and Difficulty of Planning the Future Society," *Environment and Change*, ed. Ewald, p. 253.

[21] "Uncle Sam, Arms Peddler Supreme," *San Francisco Chronicle*, July 7, 1969, p. 14.

Anger of both militant revolutionists and many who have wished to work within the political system has been exacerbated by the size of the annual military research on nerve gases and germ warfare and by the budget for the Defense Department, which has commanded a total of $648,161 billion during the past decade. Because of contractual commitments to such programs as ABM, MIRV, C5A, and F111, Defense Department budgets will probably not be cut substantially even if American troops are withdrawn from Southeast Asia. As a consequence of military expenditures, other priorities—adequate housing and good, clean air and water, a decent education for all—all go wanting, claim the critics.

Should a war within this nation occur, it is difficult at present to determine whether it would be between races or classes. According to a recent Gallup Poll, dissatisfaction among blacks with the rate of their progress into the mainstream of American life has gone up 16 percent in the past three years, an increase from 43 to 59 percent reporting that progress is too slow. Nevertheless, 63 percent of those surveyed believe blacks can win their rights without violence, and 69 percent oppose the idea of a separate black nation within the United States.[22]

Alliances between radical white students and black militants, suggesting the possibility of class rather than purely racial strife in the United States, have recently increased, though such alliances have been repudiated by some black leaders, among them Stokely Carmichael. In resigning as prime minister of the Black Panther Party, Carmichael listed among his reasons his belief in the need for an "unrelenting armed struggle against the white Western empire" and his rejection of the Panther Party's recent alliances with radical white organizations.[23]

One could undoubtedly make justifiable cause for a civil war between either races or classes within the country. Balanced against the historical oppression of Negroes, Indians, Mexican-Americans and, to a different if not lesser degree, Orientals is the greater number of poor whites inhabiting areas like the South and the Appalachian range. As Harrington, Theobald, Drucker, and other economists have insisted, there is no economic necessity for 15-25 percent of the population living in poverty while being surrounded by the affluence of their fellow citizens. Subsidization through guaranteed annual income or the more euphemistic and therefore more acceptable negative income tax favored by the Nixon administration could end poverty within the next decade, in which case grounds for class warfare would be considerably lessened. Such subsidization already exists for farmers, who received $3.3 billions in 1968 in price support payments. Being paid for not mining coal or not working on assembly lines is little different from being paid for not growing crops.[24]

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[22] "New Poll of Black Unrest," *San Francisco Chronicle*, June 23, 1969, p. 9.

[23] "Panthers React on Carmichael," *San Francisco Chronicle*, July 5, 1969, p. 2.

If a major war, either civil or international, does occur within the next three decades, the forecasts and predictions that follow are in the main worthless; for they presume the absence of a cataclysm and postulate a world in which change, though not always orderly, is at least not convulsive because of bombs, gas, germs, and guns.

Natural Resources

In *Resources in America's Future*, a massive study undertaken for Resources for the Future, Inc., a nonprofit corporation financed by the Ford Foundation, Landsberg, Fischman, and Fisher conclude that though vastly greater quantities of natural resources will be needed by the United States in the future, small possibility exists of any general exhaustion of resources during the remainder of this century or for a long time thereafter. However, their forecasts of adequate natural resources and sustained economic growth are contingent upon a number of conditions: that technological advances and economic adoption of them continue, that foreign sources of raw materials remain open "through maintenance of a viable world trading and investment system," and that government policies on resources and private management of enterprises involving resources "improve in farsightedness, flexibility, and consistency." Each of these contingencies, the authors claim, "presents difficulties and opportunities which are well within the capacity of research, policy, and action to deal with successfully." [25]

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[24] "T.R.B. from Washington: The Grow-Nothing Entrepreneurs," *San Francisco Sunday Examiner and Chronicle*, July 6, 1969, p. 3.

[25] Hans H. Landsberg *et al.*, *Resources of America's Future: Patterns of Requirements and Availabilities, 1960-2000*, p. 53.

In any long-range plans, economic calculation and technological ingenuity must observe the injunctions of ecology:

> In a number of ancient civilizations the misuse of water, soil, and grass led to, or was accompanied by, disintegration. In the exploitation of land and water resources, there are ecological "points of no return" beyond which the resource cannot be rebuilt except at exorbitant cost, if at all. These points should be respected as a matter of social insurance for the distant future. . . .[26]

Shortages will be avoided by using lower grades of raw materials substituting plentiful materials for scarce ones, getting more use fr given amounts, importing some things from foreign countries, and making multiple use of land resources.[27] The latter means of avoiding shortage is imperative, since increasing demands for outdoor recreation, urban growth, highways, airports, foodstuffs, and perhaps forests "would add up to 50 million more acres than the country has." [28]

Fuller is another who believes that there should be no necessary future shortage of natural resources. In fact, he takes a global rather than a national perspective, maintaining that over a decade ago it came into scientific view and was reported unequivocably by Gerard Piel, publisher of *Scientific American*, that

> *for the first time in the history of man, it was in evidence that there could be enough of the fundamental metabolic and mechanical energy sustenance for everybody to survive at high standards of living—and furthermore, there could be enough of everything to take care of the increasing population while also improving the comprehensive standards of living.* Granted the proper integration of the world-around potentials by political unblockings, there could be enough to provide for all man to enjoy all Earth at a higher standard of living than all yesterday's kings, without self interferences and with no one being advantaged at the expense of another.[29]

Not so sanguine about conservation of resources (or of Americans', let alone man's, fate), Michael maintains that we will be short in this country of skilled human resources and of time needed to get necessary massive social tasks accomplished. Consequently, we will have to assign social priorities and make sure that resources allocated them are efficiently used. In attempting to accomplish tasks of high priority, we cannot, warns Michael,

> wait for the bigoted, the uneducated, the backward-looking, the vested

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[26] *Ibid.*, p. 51.
[27] *Ibid.*, pp. 4-5.
[28] *Ibid.*, p. 46.
[29] R. Buckminster Fuller, "Keynote Address, Vision 65," p. 6.

> interests to see the needs of the world of the future in their good time: there isn't that kind of time left in which to cope with the complexities of this society before they become intractable—if they aren't already. . . . But who is this "we" that will do these things? The "we" consists of intellectually limited and emotionally crippled human beings, stumbling along on untested methodological crutches over a volcanic terrain of outmoded organizations. While we must and want to do long-range planning, we won't be able to do it well.[30]

Urbanization

Kingsley Davis, Director of International Population and Urban Research, University of California, Berkeley, recently declared that the urban population of the world at the end of this century may exceed today's entire world population if the present growth rate continues and no major calamity occurs. Estimating that today's rural and urban population of 3,605,000,000 will swell to between 5,231,000,000 and 6,233,000,000 within thirty years, Davis stated that between 2,851,000,000 and 3,710,000,000 persons will be living in urban towns and cities.[31]

What is a global phenomenon must perforce be a national phenomenon, one slowly but clearly manifested in the United States, which as late as 1790 had only twenty-four urban places, containing only 5 percent of the nation's population. By 1950, urban places numbered 4,700 and were inhabited by 97 million persons, approximately 64 percent of the population. For 1960 these figures had swollen to 125 million persons, almost 70 percent of the population living in 6,000 urban places.

Along with urban growth has been explosive metropolitan growth in the United States since 1900. At the turn of the century about sixty areas would have qualified as being metropolitan under federal definitions. These sixty areas then contained fewer than 24 million persons, less than 33 percent of the total population. Projected for 1980 is a metropolitan population of about 170 million persons.[32] Of these, 100 million are projected to be in suburbs, 70 million in central cities.[33] By 2000 a minimum of 83 percent, or 281 million—of a total population of 338 million—are expected to be living in metropolitan areas.[34]

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[30] Michael, *The Unprepared Society,* pp. 76-77.

[31] Archibald MacLeish, "Archibald MacLeish Stresses That Youth Can Help in Growth of 'New Humanism,'" *University Bulletin* (May 5, 1969), 1-2.

[32] P. Hauser and Martin Taitel, "Population Trends—Prologue to Educational Programs," *Designing Education for the Future,* No. 1: *Prospective Changes in Society by 1980,* ed. Morphet, pp. 29-30.

[33] *Ibid.*, p. 37.

[34] *Wall Street Journal* Staff, *Here Comes Tomorrow,* p. 107.

One conjecture is that 3,000 acres per day are now being urbanized in the United States, with urbanites taking far more land per person than was taken a century ago. In 1850, 1,000 urbanites used ten acres; in 1920, 1,000 urbanites used thirty acres; in 1950, 1,000 urbanites used one to two hundred acres. These figures lead Ewald to assert that deliberate policies for land use are needed today if we are to avoid running out, not of land, but "of the particular use of land where it is wanted."[35]

Kahn and Wiener foresee for the United States at least three gargantuan "megalopolises" by the year 2000: one extending between Boston and Washington, D.C., and containing almost one-quarter of the population (about 80 million people); another concentrated around the Great Lakes, stretching from Chicago to Pittsburgh and possibly north to Toronto and containing more than one-eighth of the population (over 40 million people); and the last from San Francisco to San Diego, containing one-sixteenth of the population (about 20 million people). "The three megalopolises should contain roughly one-half of the total United States population, including the overwhelming majority of the prosperous, intellectual, and creative elements."[36]

The movement toward urbanization has been and continues to be costly, for it has left in its wake such unresolved problems as poverty, human relations, housing, pollution, conservation, traffic, education, health, and welfare—problems which Hand believes "demand a national policy to plan, program, and manage massive and unrelenting change."[37] Seriously implementing such a policy would not be cheap. Lynch estimates that the yearly bill for the new urban development and redevelopment that he believes we should be doing "will rise to the order of $250 billion per year in the next generation," one-tenth of which should be devoted to basic and developmental research on city environment.[38] Myrdal estimates that creatively developing our environment, society, and people could run to trillions of dollars and that eradicating slums and rehabilitating slum dwellers would take at least a generation under the best of circumstances. These estimates lead him to conclude that America's wealth is greatly exaggerated, for its affluence is heavily mortgaged:

> America carries a tremendous burden of debt to its poor people. That

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[35] William R. Ewald, Introduction, *Environment and Change*, ed. Ewald, p. 6.

[36] Kahn and Wiener, *The Year 2000*, p. 61.

[37] Irving Hand, Preface, *Environment and Change*, ed. Ewald, pp. xii-xiii.

[38] Kevin Lynch, "The Possible City," *Environment and Policy*, ed. Ewald, pp. 155-56.

> this debt must be paid is not only a wish of the do-gooders. Not paying it implies a risk for the social order and for democracy as we have known it.[39]

That we are currently running from this debt rather than paying it is particularly evidenced by recent Census Bureau reports of declines in big-city populations. The largest 257 cities in the United States have been losing an average of 381,000 persons per year for the past two years, the first major declines in large-city populations in the nation's history. By comparison, these same cities averaged yearly gains in population of 271,000 persons from 1960 to 1966. The exodus of white Americans from cities nearly quadrupled in 1966-1968: from an average of 141,000 a year in 1960-1966 to an average of 486,000 in 1966-1968. Joining the exodus have been economically successful Negroes who have moved to suburbs to take advantage of integrated residential housing. The Negro suburban population rose an average 221,000 persons a year in 1966-1968, over eleven times as fast as the yearly average of 19,000 in 1960-1966. At the same time, the migration of black Americans to the cities has appreciably slowed down, possibly because of industrial growth in the South. The Negro populations of the 257 largest cities rose 111,000 a year in 1966-1968, as compared to 370,000 a year in 1960-1966.

Sylvia Porter, who reported and discussed the Census Bureau's figures in her syndicated newspaper column, attributes the declining populations of the large cities to "riots, racial tensions, soaring crime rates . . . pollution, traffic jams, rising rents, falling quality of schools." As she notes, a high proportion of those leaving the city are in their young to middle years, financially able and independent, while a high proportion of those left behind are in poorer households often headed by women or older citizens, households with lots of children or broken families—the people in short, least able to pay taxes to finance "the soaring costs of essential public services." With no sign of a reversal in these new population trends, "the financial outlook for our cities," Miss Porter concludes, "has never been bleaker." [40]

In 1967, Abrams pointed out that the loss of wealthier taxpayers had made the cost of essential city services impossible to bear by those remaining behind. Along with the departure of the more affluent citizens and the decline in revenues for the cities has been the rise in state and federal taxes:

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[39] Myrdal, "The Necessity and Difficulty," p. 260.

[40] Sylvia Porter, "The Shrinking Big Cities," *San Francisco Chronicle*, June 26, 1969, p. 55.

> A generation ago, municipalities were collecting more taxes than the national and state governments combined, but their revenues, which were 52 percent of the total as recently as 1932, had dropped to 7.3 percent by 1962. Unable to finance their requirements from taxation, the cities have resorted to borrowing, and between 1946 and 1964, when federal debt per capita actually declined, local debt per capita more than trebled.

The federal government, Abrams maintains, has failed to share rising costs of education and safety. Even when it has offered aid for housing, urban renewal, or welfare, it has increased the burden of already overburdened local treasuries by requiring the cities to contribute a share. "When the cities have tried to meet the costs of these services (or of existing services) by raising taxes, they have simply accelerated the flight to the suburbs."[41]

Weaver sees the future of the city being inextricably related to the future of the urban poor, particularly to the fate of the American Negro and in commensurate degree to the fate of such smaller minority groups as the Mexicans, Puerto Ricans, Indians, and migrant laborers. Escape to the suburbs or the fringes beyond cannot serve in the long run as escape from responsibility to those who have not yet been provided full and equal opportunity to participate in the political, economic, and social affairs of the nation. Wedded to inner cities by more than freeways and finances, metropolitan areas can survive in healthy condition only if the core cities maintain their vitality:

> It should be made clear that a reference to the city . . . means not only the central or inner city but the suburbs, the metropolitan regions surrounding cities, and the urbanizing fringe areas beyond. There are no solutions for any of them that do not affect the others and do not depend on the others.[42]

One cannot with assurance predict the long-range effects of concentrating massive numbers of people into metropolitan areas. But clearly the effects will not be salubrious for individuals or beneficial to their environment if present conditions are harbingers.

Bacq claims that geneticists have already spotted many mutagenic substances introduced into both the food and the atmosphere of crowded cities. Not only are these substances expected to increase in concentration in the future, but the level of the background of ionizing radiations is also expected to increase. "Thus, the most precious acquisition of mankind during the evolution of the species, our genetic equipment, is threatened."[43]

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[41] Charles Abrams, "Housing in the Year 2000," *Environment and Policy*, ed. Ewald, pp. 217-18.

[42] Robert C. Weaver, "Urban Problems and Group Relations," *Knowledge and the Future of Man*, ed. Ong, p. 87.

The United States now spends $3 billion annually to burn or dump garbage, more than the gross national products of Ecuador, Luxembourg, and Iceland combined. Despite the expenditure, neither method of trying to purge the nation of its waste is wholly satisfactory. Incineration contributes to air pollution and is worthless for getting rid of tin cans, disposable bottles, and plastics—objects which resist burning but which are preferred by consumers, who like better the convenience and waste of throw-away packaging than the inconvenience and tidiness of reusable bottles. Free land suitable for dumping has become difficult to find as large cities have run out of marginal lands suitable for reclaiming. The huge area of marshland in Staten Island used by New York City as its principal dump in recent years is about ready to become a park, and the city has not yet found a successor. Philadelphia may have to begin burying its garbage in Pennsylvania's abandoned anthracite mines. Having dumped so much waste along its shoreline that its bay has shrunk in area one-third, San Francisco explored the possibility of leasing dumping rights from a rural county 375 miles to the north before negotiating a one-time five-year contract to truck its refuse to a neighboring county which wishes to create a park upon the fill.

The only solution to the problem of rubbish may be a mammoth, expensive plan to recycle all solid waste by breaking it down and reusing it. To date Congress has shown little inclination to finance such a plan. Though it voted a solid Waste Disposal Act in 1965 to be administered by the Public Health Service, it provided only $20 million a year to enforce provisions of the Act. In the current session of Congress, Senator Edmund Muskie has a bill which would increase that amount tenfold, "but a concerted attack on garbage is still at least a decade away."[44]

One no longer has to concentrate to think of places where environmental pollution has quickly destroyed one of nature's delicate ecosystems. Lake Erie has been so badly polluted, principally from industrial detritus flowing into it from the Cuyahoga River, that its fishlife is nonexistent. Only sixteen years ago, in 1955, it supported com-

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43. Z. M. Bacq, "A Vicious Circle of Chemicals against Chemicals?" *The World in 1984*, Vol. 2, ed. Calder, p. 27.

44. Richard Boeth, "All That Garbage—and No Place to Put It," *San Francisco Sunday Examiner and Chronicle*, July 13, 1969, Section A, p. 16.

mercial fishing and supplied 75 million pounds of fish for human consumption. Oil seepage off the coast of Santa Barbara, DDT poisoning of California pelicans, pesticide contamination of planktonic diatoms (which produce through photosynthesis much of the oxygen in our environment), deaths from emphysema, rising rates for allergies—many are the ominous signs of environmental destruction and deterioration that have followed hard upon expansion of industry, population, and metropolitan congestion since the turn of the century. Well aware of these signs worldwide, Ehrlich is persuaded that

> in the long view the progressive deterioration of our environment may cause more death and misery than any conceivable food-population gap. And it is just this factor, environmental deterioration, that is almost universally ignored by those most concerned with closing the food gap.[45]

Not the least of the misery that environmental congestion brings is the individual's feeling of impotence and alienation as he daily confronts impersonal institutions and is thrust among strange multitudes. As the individual's world expands, the number of his contacts with other people increases, but the quality of relationship goes notably down. This sad and curious truth leads Alexander to comment:

> It is not surprising that in just those urban centers where the greatest expansion of human contacts has taken place men have begun to feel their alienation and aloneness more sharply than in any preindustrial society. People who live in cities may think that they have lots of friends; but the word friend has changed its meaning. Compared with friendships of the past, most of these new friendships are trivial.[46]

It may be, as Abrams hopes, that the tendency of world urbanization to confine people in concentrated areas "will make all nations vulnerable to destruction and therefore more reluctant to employ their awesome prerogatives." [47] It may be, as Gross believes, that the megalopoli of the future will transcend national boundaries by providing home bases and regional offices of organizations engaging in operations encircling the world, and that even these megalopoli will become obsolete with the availability of low-cost, instantaneous transmission of information and energy in many forms.[48] But for his perpetuation, it must be that man eventually comes to think of himself as an astronaut living on a spaceship 8,000 miles in diameter. Then, as Prehoda says, "our communities could be modified so that they resembled the closed ecology required on manned spacecraft."[49]

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[45] Ehrlich, *The Population Bomb*, p. 46.

[46] Christopher Alexander, "The City as a Mechanism for Sustaining Human Contact," *Environment for Man*, ed. Ewald, pp. 61-62.

[47] Abrams, "Housing in the Year 2000," p. 226.

[48] Bertram Gross, "The City of Man: A Social Systems Reckoning," *Environment for Man*, ed. Ewald, pp. 140-41.

Income and Employment

All projections of the United States economy indicate increasing national and personal wealth in the decades ahead.

The Twentieth Century Fund estimates in terms of 1960 dollars that disposable personal income will rise from $376 billion in 1962 to $626 billion in 1975—or $9,525 per family in 1975 as compared to $7,011 in 1962.[50] The National Industrial Conference Board estimates that by 1980 the typical American household will earn $14,000 in terms of current dollars. The number of families with incomes above $10,000 will rise from 15 million to 34 million, while those with less than $5,000 will decrease from 13 million to fewer than 11 million out of a total of 61,400,000. Gross national product is expected, barring inflation above 2 percent, to reach nearly $1.25 trillion by 1975 and $1.5 trillion by 1980.[51]

Kahn and Wiener's "surprise-free" scenario calls for a $1 trillion economy in 1975 (compared to a 1965 GNP of $681 billion), $1.5 trillion in 1985, and about $3 trillion in 2000. With a population of 318 million by 2000, per capita GNP will be slightly more than double the 1965 amount if the annual increase in productivity per man hour is 2.5 percent and about 3.5 times the 1965 figure if the productivity per man hour increases at an annual rate of 4 percent. Kahn and Wiener estimate per capita GNP in the year 2000 to be $7,300 in terms of 1965 dollars, a year in which per capita GNP was $3,600.[52]

The authors of *Resources in America's Future* estimate the population in 2000 to be 331 million and the GNP $2.2 trillion. Income per worker will rise, they project, from $6,920 (1960), to $10,400 (1980), to $15,500 (2000). Per capita purchases will be $4,000 by 2000, as compared to $1,830 in 1960 and $2,700 in 1980.[53]

Though projections may differ from group to group—depending upon assumptions about birth rate, rate of inflation, productivity per man hour, and size of the available labor force—all prognosticate dramatic increases in the affluence of the United States and other industrial and post-industrial countries.

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[49] Robert W. Prehoda, *Designing the Future*, p. 114.

[50] Arnold B. Barach, "Changing Technology and Changing Culture," *Automation, Education, and Human Values*, ed. Brickman and Lehrer, pp. 53-54.

[51] *Time*, May 23, 1969, p. 97. It should be noted, however, that in recent years inflation has been rising 6 percent annually.

[52] Kahn and Wiener, *The Year 2000*, pp. 167-68.

[53] Landsberg *et al.*, *Resources in America's Future*, p. 57.

The GNP and per capita income of developing nations is not expected to increase anywhere near as remarkably. Kahn and Wiener project per capita income, based on 1965 U.S. dollars, to rise from 1965 to 2000 as follows: $141 to $277 in Africa; $152 to $577 in Asia; $357 to $695 in South America. These figures contrast sharply to anticipated rises in Europe, including the U.S.S.R. ($1,369 to $5,055) and North America ($2,632 to $6,255).[54] At present rates of economic development, it would take Indonesia 593 years to achieve the 1965 GNP per capita of the United States ($3,600); Columbia, 358 years; Nigeria, 339 years; Mexico, 162 years; S. Africa and S.W. Africa, 115 years; China, 101 years.[55]

Lenica and Sauvy report that 64 percent of the earth's total population (inhabitants of the Third World) now receive 19 percent of the gross world product, while 13 percent (living mostly in Western Europe and the United States) receive 55 percent.[56] This ratio is not expected to differ appreciably in the next thirty years. Whether inhabitants of the Third World, however, will willingly continue to abide the disparity between their wealth and that of citizens of highly industrialized nations is questionable.

Even more questionable is the role of employment, particularly in post-industrial nations. No aspect of the future appears as fraught with contrary opinion and polemic prediction as does the place of work in the years ahead.

Kahn and Wiener believe that automation and cybernation, by contributing to the increase of productivity and economic growth, will probably create during the near future as many jobs as they eliminate.[57] Fein disagrees. Conceding that a high correlation between the introduction of technology and prolonged increase in the employment of human labor existed in early industrial society, Fein argues that the correlation no longer holds: the kind of employment innovative technology once stimulated is itself being automated today:

> . . . when we arrive at a stage of society, as we have today, where not only the production of new products but their distribution, maintenance, sales, accounting, office work, and so on, can also be automated, thereby requiring not human labor but machines to do this added amount of work economically and efficiently, then increased em-

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[54] Kahn and Wiener, *The Year 2000*, p. 139.
[55] *Ibid.*, p. 149.
[56] Jan Lenica and A. Sauvy, *Population Explosion*, pp. 76-77.
[57] Kahn and Wiener, *The Year 2000*, p. 93.

> ployment can be expected all right—but not of people. A rational economy should only expect to employ more machines under such conditions.[58]

That automation and computers are having a profound effect on the labor market is undeniable. Venn reports that automatic elevators displaced 40,000 elevator operators in New York City alone, that new equipment in the Census Bureau enabled 50 statisticians to do the work in 1960 that required 4,000 in 1950, that the check-writing staff in the Treasury Department has been reduced from 400 people to 4.[59] Barach points out that in less than fifteen years, 3,000,000 were replaced by machines in coal mines, over 130,000 were made surplus in steel mills, and only half as many man hours are now needed to produce a car.

> Today two workers do the job of 200 in making 1,000 radio sets each day. Ten men do the job of a previous 400 in producing auto motor blocks with an automated machine. Only 14 operators are needed to preside over the glass-blowing machines that make 90% of all our light bulbs.[60]

Prehoda maintains that unemployment definitely has been increasing as a consequence of automation. Whereas 2.6 percent of the labor force was unemployed during 1958-1959, the percentage of unemployed rose steadily for over a decade: 3.9 percent in 1953-1954; 5.0 percent in 1957-1958; 6.4 percent in 1960-1961. From 1961 to 1964, unemployment averaged 5.7 percent despite an annual increase in GNP of 5 percent providing, says Prehoda, strong support for the contention that automation can now greatly increase national productivity without substantial additions to the labor force. Recent decreases in unemployment, between 3 and 4 percent of the national work force, he attributes to a partial wartime economy produced by our increased financial commitments to the conflict in Vietnam.[61]

Technology does create new jobs as it destroys old ones. However, as Venn notes, most new jobs are cognitive and not manual: displaced workers cannot fill them unless they have the educational potential and the training opportunities necessary to meet higher requirements.[62] In 1900 the number of white-collar jobs was less than half the number of blue-collar jobs, whereas by 1975 it is projected to

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58. Louis Fein, "The P. I. Bill of Rights," *Symposium II*, p. 35.
59. Grant Venn, *Man, Education, and Work*, p. 4.
60. Barach, "Changing Technology," p. 58.
61. Prehoda, *Designing the Future*, pp. 36-37.
62. Venn, *Man, Education, and Work*, pp. 19-20.

be almost 44 percent greater.[63] Between 1958 and 1960, the number of blue-collar production workers declined by nearly a half billion, while nonproduction white-collar workers rose 1.5 million. "In large corporations such as General Motors, United States Steel, Du Pont, and Standard Oil, over 35 percent of all employees are now white-collar." [64]

In the shift from manual to cognitive work, from an industrial to a post-industrial society, low-skilled, inexperienced, and poorly educated workers have found themselves increasingly unemployable. Employers seem to believe that cognitive work requires a command of standard English only infrequently possessed by the poorly educated and/or the disadvantaged whose daily environment has not demanded of them the refinements of vocabulary and syntax in both spoken and written discourse demanded of the educated middle class. If students from disadvantaged backgrounds are to become contributors to a knowledge society, teachers of English must assume a major responsibility for educating them.

Documenting the discrepancy in employability between the well and poorly educated, Killingsworth reports that during the 1950-1962 period, the number of jobs held by workers with an eighth-grade education or less decreased by 6.2 million, and jobs held by workers with college training or a degree increased by 5.3 million. Although the average level of unemployment in both 1950 and 1962 was about 6 percent for males in the labor force, unemployment rates were substantially higher in 1962 than in 1950 for the less-educated and substantially lower for the best-educated workers.[65]

Drucker believes that in the next decade we face real problems in respect to the unskilled worker, to the craft tradition of skilled work, and to the ghetto Negro. "For in these three areas . . . the shift to knowledge work presents a threat and creates a problem. In these areas . . . we are likely to make the most dangerous mistakes, especially the mistakes of trying to hold on to, and to defend, yesterday."[66]

In particular, the problems of the ghetto Negro in finding employment are great and, at present, seem irresolvable. Venn states that the jobless rate among Negro youth has risen twice as fast as among whites since 1955. "Only about one-fifth of the young Negro workers with a high school diploma have white collar jobs; more than one-half of the young white workers have such jobs."[67] In 1966 Whitney Young, Jr., asserted that 60 percent of all nonwhite families have annual incomes of $3,000 or less; that 75 percent of the Negro labor force is in the semiskilled or unskilled categories; that of the million aged sixteen through twenty-one who are out of school and out of work, 50 percent are Negro; that according to a projection by the Bureau of Labor and Economic Progress, if nonwhites hold in 1975 the same proportion of jobs in each occupation as in 1964, the nonwhite employment rate will be more than five times that for the labor force as a whole. Even if trends in upgrading the jobs of nonwhites continue at the same rate as in recent years, the unemployment rate for nonwhites in 1975 will still be about two and one-half times that for the entire labor force.[68]

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[63] *Ibid.*, p. 7. [64] *Ibid.*, p. 8.

[65] Charles Killingsworth, "The New Technology Is Shaping a New Labor Force," *New York Times* (advertisement), April 24, 1966, Section 11, pp. 8-9.

[66] Drucker, *The Age of Discontinuity*, pp. 296-97.

Compounding the difficulty of educating blacks for cognitive occupations has been the exodus of middle-class whites to suburbs, an exodus which has created metaphorical walls of freeways and highways between which are trapped the poor, who, unable to finance the schools they need, are forced to accept second- and third-rate education for themselves and their young. If the ethnic shift of whites to suburbia and exurbia and of blacks to the cities were to continue at rates established between 1940 and 1965, by the year 2000 Washington, D.C., would have a black population of 75 percent; Cleveland, 67 percent; Newark, 63 percent; Baltimore, 56 percent; Chicago, 55 percent; and New York City, Philadelphia, Detroit, and St. Louis, 50 percent. Further, Atlanta, Kansas City (Mo.), Cincinnati, San Francisco-Oakland, Houston, Buffalo, and Pittsburgh would have black populations of between 34 and 44 percent.[69] As has been pointed out earlier, however, present indications are that the migration of southern blacks to large cities has begun to abate. Still to be seen are whether this phenomenon is temporary and whether it will have long-range effects on the ratio of blacks to whites in the cities just cited.

Too, only time will tell whether current efforts to improve the education of blacks are massive enough, creative enough, and far-sighted enough to break the cycle of ignorance and despair within which many of them live. Recruiting outstanding young people for

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[67] Venn, *Man, Education, and Work*, p. 28.

[68] Whitney Young, Jr., "The Negro's Economic Future Hangs in the Balance," *New York Times*, April 24, 1966, Section 11, p. 12.

[69] Kahn and Wiener, *The Year 2000*, p. 204. (The 1970 Census proves these estimates conservative: Atlanta population is 51.3 percent black, Washington, D.C., 71.1 percent. It also invalidates indications about abatement of southern black migration to large cities [*New York Times*, February 11 and May 19, 1971]).

VISTA and outstanding teachers for ghetto schools, developing Head Start and Job Corps programs, establishing storefront schools, changing admission standards and providing financial aid for black students entering colleges and universities, providing tutorial services elementary through university for disadvantaged youth—such efforts may eventually give the majority of blacks access to the main economic streams of the affluent knowledge society. But present efforts, in comparison to the magnitude of the problem, do appear minuscule.

Regardless of race, young people have also been affected by the shift from manual to cognitive labor. No longer do they find opportunities to set pins in bowling alleys, milk cows, chop wood, bell hop, work summers in industry, or perform for pay the occasional jobs that were available two or three decades ago. By not holding a job, youth not only are denied a traditional initiation symbol into adulthood and its responsibilities but are prevented from establishing at an early age a respect for legitimate authority. The consequences may not be just a widening and deepening of the generation gap between young people and adults but a serious lack of understanding by youth of how a society, to preserve itself, utilizes authority and delegates tasks in order to have varied and necessary functions performed. Anomie is widespread, particularly among young people of minority backgrounds who cannot anticipate a time when they will be full participants in the economy, as well as among young people who have repudiated values they believe responsible for their parents' affluence.

As was earlier indicated, whether service industries—among them teaching, medicine, science, social work, technical trades—can provide jobs needed to keep a growing labor force employed is problematic, particularly since these industries demand higher levels of education and perhaps ability than those presently possessed by unskilled and semiskilled workers. Nevertheless, Keyserling, who opposes Theobald's support for a guaranteed income for both poor and middle income people, maintains that there are sufficient outstanding needs in this society and in the world to keep our capacities for production going full scale and our rate of unemployment low. He finds improvements, rather than radical changes in our existing economic system, a preferable alternative to the guaranteed income.[70] Mesthene also holds that a national increase in unemployment is not a necessary consequence of mechanization and automation. Although unemployment may increase in the forms of unavailability of employment, a shortening work week, lengthening vacations, or an extension in the period of formal schooling, the increase will occur "either voluntarily or as a result of inadequate education, poor social management, or failure to ameliorate our race problem, but they are not necessary consequences of new industrial technology." [71]

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[70] Leon H. Keyserling, "Dialogue," *Dialogue on Poverty*, ed. Theobald, pp. 126-27.

In marked contrast to the possibility of some persons finding themselves permanently unemployable or unemployed is the possibility of some persons having more than one important career in a lifetime. Believing that many intelligent people become stale in their careers after a number of years, Drucker thinks it important that we provide opportunities "for the middle-aged knowledge worker to start a second knowledge career." [72] Mesthene believes that more than one career per lifetime is likely to be the norm, not because the knowledge worker becomes stale but because "employing institutions and job contents both change."

The consequences of changing careers during a lifetime will be profound:

> Group identities will shift as a result: every occupational change will involve the individual with new professional colleagues, and will often mean a sundering from old friends and cultivation of new ones. Increasing geographical mobility . . . will not only reinforce these impermanencies, but also shake the sense of identity traditionally associated with ownership and residence upon a piece of land. Even the family may lose some of its influence as bastion of personality, as is already discernible in advanced countries in the decline of the extended family.[73]

The Computer, Cybernation, and Leisure

Responsible in good part for the uncertainty if not confusion regarding the future of employment in the society, the computer is now affecting the structure and performance of every major institution. It has been called upon to bookkeep, monitor underground nuclear explosions, control newspaper type, dictate how sausage is made, navigate ships and planes, mix cakes and cement, prepare weather forecasts, check income tax returns, direct city traffic, and diagnose both human and machine ailments.[74] Further, it has been used to store and retrieve knowledge; rule on the authenticity of authorship; prepare concordances; play checkers, chess, and war; help capture criminals and guide astronauts to the moon. It has even been used to pick out

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71. Emanuel G. Mesthene, "How Technology Will Shape the Future," *Environment and Change*, ed. Ewald, p. 143.

72. Drucker, *The Age of Discontinuity*, p. 292.

73. Mesthene, "How Technology Will Shape the Future," pp. 144-45.

74. "Technology: The Cybernated Generation," *Time*, April 2, 1965, p. 84.

from records of talented individuals the records of those persons most suitable for presidential appointments.[75]

Theobald believes that economists grossly misunderstand the computer's implications, that they are oblivious to the rate of change it induces. He points out that the first commercial computer was installed in 1950, that by 1960 there were five thousand computers, and that by 1970 there will be approximately seventy thousand computers, each used by an average of ten people on a time-sharing basis and each, on the average, at least a thousand times faster than it was in 1960—an increase in computer power during one decade of a hundred and forty thousand times, with no apparent reasons for the rate of increase in power to slow down soon:

> Now I am led to conclude . . . that the computer can take over the great majority of structured jobs in the relatively near future. Structured jobs are those jobs for which the decision-making rules can be set out in advance . . . what most of us do most of the time are structured jobs, and that is as true of the middle level manager, the accountant, the lawyer and the engineer as it is true of the blue collar worker. . . . I am increasingly led to believe that the problem of the displaced middle income individual represents potentially a more serious social upheaval than the problem of the displaced blue collar worker.[76]

Ware claims that, by the early 1970's, "computers will be small, powerful, plentiful, and inexpensive" and that "computing power will be available to anyone who needs it, or wants it, or can use it," by means of either a console connected to a large central computing facility or a small personal machine.[77] The impact of the computer, says Bell, will be vast. He foresees a national information-computer-utility system, "with tens of thousands of terminals in homes and offices 'hooked' into giant central computers providing library and information services, retail ordering and billing services, and the like." [78] McIrvine believes that we are rapidly moving towards a society "wherein all activities amenable to operational definition may be removed from the realm of human activity." [79]

Already, maintains Gabor, people below an I.Q. of 80 have no economical value whatever for an industrial society.[80] We face the possibility, he says, of a future world in which only a minority need work to keep the great majority in idleness and luxury.

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[75] John W. Macy, Jr., "Automated Government," *Saturday Review,* July 23, 1966, p. 25.

[76] Robert Theobald, *Dialogue on Poverty,* pp. 110-11.

[77] W. H. Ware, *Future Computer Technology and Its Impact,* pp. 12-16.

[78] Daniel Bell, "The Year 2000—The Trajectory of an Idea," *Daedalus* (Summer 1967), p. 642.

[79] Edward McIrvine, "The Admiration of Technique," *Dialogue on Technology,* ed. Theobald, p. 36.

> Soon the minority which has to work for the rest may be so small that it could be entirely recruited from the most gifted part of the population. The rest will be socially useless by the standards of our present-day civilization founded on the Gospel of Work.[81]

Envisioning idleness for multitudes but not luxury for all, at least not in the next few decades, Michael expresses great concern about how the dispossessed and underprivileged both at home and abroad can occupy their time in ways that will help them maintain their self-respect. Possessing neither the resources nor the training to partake in creative leisure activities, they, nevertheless, "will possess resentment and alienation as they watch the well-to-do fill their free time with travel and gadgets and even the 'higher' types of self-fulfillment":

> We must face the inevitable correlation that large numbers of people will have free time because they will be economically useless in our kind of society. . . . It is for these people that society will have to invent forms of social being that will preserve their self-respect. . . .[82]

To prevent a disproportionate number of Negroes from falling into the class of the economically useless, Drucker believes that they must be educated in much greater numbers than at present for what he terms "knowledge jobs" or "knowledge work," work which is more productive, more satisfactory, more remunerative than is either skilled or unskilled manual labor. Any other policy will be disastrous, he thinks, for the Negro minority and a direct attack on them. Massive efforts must be made to find, identify, develop, and place the largest number of Negro knowledge workers as early as possible:

> It means working with boys and girls at a very early age, helping them plan careers, encouraging them to stay in school and to learn, showing them opportunities, examples, and models. It means going to the Negro family to encourage the support for schools and learning which has been so singularly lacking the last few years. . . . It means making learning and teaching relevant and effective. It means also the development of programs . . . to give adolescents and even adults a second chance to put to use their native abilities.[83]

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[80] Dennis Gabor, *Inventing the Future,* pp. 129-30.

[81] *Ibid.,* p. 133.

[82] D. N. Michael, "Free Time—The New Imperative in Our Society," *Automation, Education, and Human Values,* ed. Brickman and Lehrer, p. 302.

[83] Drucker, *The Age of Discontinuity,* pp. 308-309.

Fein thinks that society is already padding in every way conceivable the work load of individuals and that it has been highly creative in finding respectable ways of paying people who do not work—liberal severance plans, early retirement plans, extended vacations, sabbaticals, pensions, coffee breaks, sick leaves, attendance at conventions, social security, unemployment compensation, crop supports, subsidies, "and a myriad of other devices that directly or indirectly render morally and socially acceptable the idea of paying persons even though they are not working."[84] Therefore, states Fein rather caustically, because we do not need to employ all the manpower available in the labor force to make the goods and services the society should consume,

> the main outcome of literacy training, retraining, and education programs just cannot be to prepare persons to become productive members in the private or public sector of our economy. The main outcome might be to give them union cards so that they, too, can qualify as featherbedders, boondogglers, or wastemakers, and thereby get a license to an income.[85]

Gabor believes that we are going through a transitional period between a work ethic and a leisure ethic. Because we have not learned yet to accept leisure gracefully, we have been inventing unnecessary work and waste—in modern forms known as Parkinson's Law. "Compulsory work is on the way out, but *compulsive work* will have to stay with us until a new generation grows up for which there will be no sharp limit between work and play."[86]

Drucker sees no end to the need for knowledge workers, however. In industrially advanced countries, the knowledge worker, Drucker claims, "is working more and more, and there is demand for more and more knowledge workers." Though the manual worker may be working fewer hours, the knowledge worker is working more hours, frequently taking his work home with him in the evening. "Knowledge work, like all productive work, creates its own demand. And the demand is apparently unlimited."[87]

A distinction that probably needs to be made is that between leisure and free time. De Grazia views leisure as a product of a liberal education and the opportunity to do the work of one's choice. Drucker's knowledge workers, by de Grazia's definition, might be enjoying leisure even while working, for they would possess the freedom "that lays the conditions for the greatest objectivity (for example in science), the greatest beauty (for example in art), and the greatest creativeness (for example in politics)."

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[84] Fein, "The P.I. Bill of Rights," pp. 36-37.

[85] *Ibid.*, p. 34.

[86] Gabor, *Inventing the Future*, pp. 118-19.

[87] Drucker, *The Age of Discontinuity*, p. 267.

> To increase leisure is difficult. It is not contained, as is free time, by time (off work) and space (for recreation). To increase free time it is usually enough to send a man, any man, home early from work. For his recreation it is usually enough to give him some space to play in. How to provide leisure? [88]

What may be necessary during at least this transitional period is a new definition of work, one which would permit individuals to be paid well for studying, for performing needed or desired services in the community for which funds are not now allocated, for volunteering their assistance to underdeveloped areas of the world. Such a definition of work is beginning to emerge. Social work, once a voluntary, unreimbursed labor performed mainly by wealthy women, is today a large and growing profession; disadvantaged students in Upward Bound programs have been paid for attending school, as have been professionals attending inservice educational programs; Peace Corps volunteers have spotted the globe.

Theobald believes man can abolish toil before the end of the century and in its place develop what he calls "work":

> I see man working in four areas: first, self-development—both mental and physical; second, the human care of human beings; third, the whole area of human relationships. It takes a lifetime to get to know somebody, and if you don't like to call it "work," I don't care. . . . Fourth, politics, the creation of a good community.[89]

One persistent and apparently irresoluble problem is the ever-widening schism in knowledge that will exist between those of average and lesser ability and those who become the knowledge workers (as Drucker describes them) and enjoyers of leisure (as de Grazia defines them). Moreover, only a select number of the latter group may be, as Michael warns, the planners of the society. And at the center of their decision-making will be the computer:

> Gradually . . . in all areas where logical model-building can enhance our understanding of social and material reality, we can expect the computer to enable men to create descriptions of that reality that will be

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[88] Sebastian de Grazia, "The Problems and Promise of Leisure," *Environment and Policy*, ed. Ewald, p. 123.

[89] Theobald, *Dialogue on Poverty*, p. 115.

> essentially incomprehensible to those who are not part of the world where reality is mediated by the computer.[90]

In the intellectual technology of the future, "such techniques as simulation, model construction, linear programming, and operations research will be hitched to the computers and will become the new tools of decision-making."[91] Some of these techniques will increase the options of a user and simultaneously make his task more complex:

> . . . models allow the user to explore many more contingencies and probabilities than would be possible if the computer didn't exist. But it means that the decision-maker has much harder decisions to make because he has to consider much more information—it's there to be considered—and much more sophisticated.[92]

The consequences for a democracy of computer-based decisions may be grave. If the majority of citizens do not understand in considerable depth the issues affecting the nation, suffrage can be detrimental to national survival. Already only a limited few appear to comprehend the full range of policies and plans shaping our participation in Vietnam; only a limited few seem to understand the fiscal complexities leading to an unprecedented increase in the prime interest rate; only a limited few apparently understand the relatively open issues motivating the activism of students, the concerns of conservationists, or the alarm of demographers.

It is not that information about these matters is unavailable: it is, with the exception of that affecting national security, usually in plentiful supply. As Michael notes, the problem is in knowing where to look to get an adequate range of interpretations, a task that becomes more difficult as the number of sources—books, TV channels, radio stations, periodicals, newsletters, pundits—increases. Too, even if one believes he has tapped a valid sample of positions, he must integrate them to arrive at an informed position:

> Given the complexity of the issues and the rapid rate of change in them and given the assertions of each source that it has the full and balanced picture, that its "exclusives" are true and full ones, the task of differentiation, discrimination, and integration will become steadily more intricate for those who seek to know and to act on what they know.[93]

And those who seek to know and act upon what they know will increasingly be a minority of the intelligent who turn to the computer for guidance.

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[90] Michael, *The Unprepared Society,* p. 50.

[91] Bell, "The Year 2000," p. 643.

[92] Michael, *The Unprepared Society,* p. 48.

[93] *Ibid.,* pp. 20-21.

Kahn and Wiener entertain seriously the possibility of control of the society passing from man to machine, "in which case, although population may be limited since it serves no useful function, to the extent to which humankind is permitted to persist it may be kept in a perpetually drugged and/or subservient state," thereby preventing "rebellion and disturbance or other 'undesirable' interference." [94]

Even without their creating this nightmare world, the computer and the forms of cybernation to which it has given birth will clearly challenge during the next thirty years the viability of democratic procedures and the numerous values which we have lived with if not always by. If that challenge is to be met successfully, humanists, prominent among whom should be teachers of English, will have to take far greater responsibility than they have so far assumed for assuring that scientific discoveries and technological innovations are put to humane rather than inhumane ends. Deprived of strong and knowledgeable guidance from the humanists, scientists and technologists should not be faulted if the tomorrow they create is one in which computers and other machines are more valuable than men.

> By the year 2000, computers are likely to match, simulate, or surpass some of man's most "human-like" intellectual abilities, including perhaps some of his aesthetic and creative capacities, in addition to having some new kinds of capabilities that human beings do not have. These computer capacities are not certain; however, it is an open question what inherent limitations computers have. If it turns out that they cannot duplicate or exceed certain characteristically human capabilities, that will be one of the most important discoveries of the twentieth century.[95]

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[94] Kahn and Wiener, *The Year 2000*, pp. 351-52.
[95] *Ibid.*, p. 89.

CHAPTER 4

GLIMPSES: PRESENTS AND PROSPECTS II

> . . . a complex marriage seems to be taking place between man and machine. The science-fiction writer Isaac Asimov has foretold the establishment of a new race of man-machine hybrids; one day it may become impossible to tell whether one is talking to a mechanized human being or a humanized machine. Or even which one is oneself.[1]

Growth, Storage, and Retrieval of Knowledge

A contributor to both the discontent of the unlearned, whom it has economically if not politically dispossessed, and the disquiet of the intellectual for whom it makes decisions ever more difficult, the phenomenal proliferation of knowledge in recent decades shows no signs of surcease:

> In 1750 there were about ten scientific journals in the world; today there are about 7,000 related to the biomedical sciences alone. Once scientists wrote about physics, chemistry, and biology; today they deal with the likes of biochemistry, bio-engineering, exobiology and bio-physics. In 1950, chemists produced 558 articles every two weeks for their publications; in 1965, in the field of chemistry alone, those learned explorers are turning out—and publishing—6,700 articles every fortnight. Small wonder that the U.S. Printing Office is drawing up plans for a new building with 40 acres of working space, six acres bigger than the Pentagon; or that Yale, if it were to continue using its obsolescent card catalogue, would need eight acres of floor space by the year 2040 just for the cards alone. The books would be virtually unhousable.[2]

As a consequence of increased literacy and scientific research, "more printed material has been published since 1900 than during the previous five centuries. And relatively even more will be published in the next 50 years." [3]

Housing and efficiently retrieving the enormous growth of printed matter will require radical changes from the traditional procedure of libraries, changes which will include publication and/or reproduction of books and magazines on cheap microfilm slides. Beckwith predicts that, with the wider use of inexpensive projectors for reading slides, not only will growing numbers of readers "prefer to buy, read, and preserve such slides," but by 2100, "most new book editions and magazine issues in advanced countries will be produced on slides," at a cost, he says, of less than fifteen cents each. Nevertheless, because books and magazines will be preferable to slides for some uses, Beckwith believes they will continue to be available indefinitely, but at a cost five to a hundred times greater than that of slides.[4]

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[1] Gordon R. Taylor, *The Biological Time Bomb,* p. 87.

[2] "Education: Libraries," *Time,* Sept. 3, 1965, p. 52.

[3] B. P. Beckwith, *The Next 500 Years,* pp. 193-94.

The use of the computer and of some form of microfilm for cataloging, storing, and retrieving library materials appears inevitable. At present, college and university libraries double their collections every sixteen years, collections which now run to two million volumes and beyond in a large university.[5] The cost of purchasing, housing, and processing an ever-expanding number of volumes has become prohibitive. Unnecessarily duplicating library resources from one campus to another has become doubly prohibitive, particularly on sister campuses of the same university system under the financial control of a state legislature.

To benefit from each other's resources, the medical libraries of Harvard, Yale, and Columbia have been tied together electronically.[6] In 1965 the Interuniversity Communications Council (EDUCOM) was founded "to provide collaboration among institutes of higher education in their efforts to utilize the emerging communications sciences."[7] The Council, supported by a $750,000 five-year Kellogg Foundation grant for administrative operations, has grown from an association of 6 universities to one of 102 colleges and universities. Faced with an 80 percent increase in students by 1974 as well as with the explosion in knowledge, the State University of New York is devoting much of its energies to developing a communications network that can make available to every faculty member and every student on every campus the total library holdings of its fifty-eight campuses:

> We believe that telefacsimile and computerized printouts make feasible the prospect of study terminals located in dormitories, in apartments, in libraries, and in student unions, so that the stored resources of the

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[4] *Ibid.*, p. 202.

[5] Harold B. Gores, "The American Campus—1980," *Campus 1980*, ed. Eurich, p. 286.

[6] "Education: Libraries," *Time*, Sept. 3, 1965, p. 57.

[7] *EDUCOM* (January 1966), inside cover.

> institution and its fact-transmitting systems can be available 24 hours a day throughout the entire University. . . . The bibliographic knowledge, the demonstration recorded on video tape, the rare manuscript, the intellectual interaction of outstanding professors, must some day be transmitted rapidly and effectively throughout the whole system.[8]

Just beginning to be exploited is facsimile transmission, through which a document can be reproduced by xerography in one library and the facsimile transmitted over telephone lines to be received in another. A network linking twelve libraries covering most of New York State now enables an upstate student to have access to the vast holdings of the New York Public Library and the scholar in New York City to draw on special library collections elsewhere in the system.[9]

Already of considerable assistance to those interested in educational research is ERIC (Educational Resources Information Center), a unit in the Division of Research Training and Dissemination, Bureau of Research, Office of Education. ERIC represents a decentralized, nationwide network of nineteen clearinghouses which acquire, review, abstract, and index documents for *Research in Education*, a monthly publication of abstracts announcing both recently completed research and research-related reports as well as current research projects in education. The Office of Education coordinates the work of the clearinghouses and nationally disseminates at nominal cost, either in hard copy or microfiche, the most significant research and research-related documents in education.[10]

Orlans contends that the comprehensive medical index (*Index Medicus*), computer-produced bibliographies, and extensive, mail-delivered photo-facsimile copies supplied by the National Library of Medicine (Bethesda, Maryland) are only a primitive indication of the services that should ultimately be available at major libraries:

> The long-range plan for the Library of Congress comes closer to the goal that technology may render practicable, and economics and scholarship desirable, for the year 2000: the storage in machine-recoverable form of the entire deposits, and the accessibility of any item, without queuing, to readers at electronically-linked metropolitan and university substations.[11]

However, as Orlans observes, before such a system can be operable, "the problems of copyright and royalties must be met squarely, with full regard to the rights of authors and publishers as well as readers."[12] These problems, if one can judge from the hearings on copyright legislation during the past five years, will not be easily resolved. If they are, then research articles might be submitted directly to editorial boards at the National Library. Upon acceptance, they would be stored in computer memories and be available for retrieval either by individuals or libraries. Such a procedure would put an end to research journals and, according to Kemeny, reduce costs and cut the time of "publication" from an estimated two years, at present, to about three months.[13]

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[8] LeRoy Boyer, "New Ties That Bind SUNY," *EDUCOM* (April 1966), p. 1.

[9] Gores, "The American Campus—1980," p. 288.

[10] ERIC Advance Information Pamphlet, U.S. Government Printing Office, 1967.

[11] H. Orlans, "Educational and Scientific Institutions," *Daedalus* (Summer 1967), pp. 828-29.

Simon claims that the following assumptions about the technology of information processing during the next ten years appear reasonable:

> 1. Substantially all information available to humans in the society will also exist in computer-available form . . . books will be stored in electronic memories at the same time that hard copy is produced for human use. . . . Many data that are now recorded or transcribed by humans will be transmitted directly to automated information processing systems without human intervention. . . .
>
> 2. Memories in information processing systems will be of sizes comparable to the largest memories now used by humans—for example, the book collection of the Library of Congress.
>
> 3. It will be feasible and economical to use English or another natural (noncode) language in interrogating the memory of an information processing system. . . .
>
> 4. Any program or information that has proved useful in one information processing system can be copied into another part of the same system at very low cost and without severe problems of standardization.[14]

Responsible for the growth in the size of computer memories and for the feasibility of conveniently storing great amounts of information have been developments in microelectronic circuitry, in techniques for photographic reduction, and in laser technology. After reporting that the National Bureau of Standards has demonstrated how photographic material can be reduced by a factor of 1,000 linearly, which is a factor of 1,000,000 in area, King comments, "Enough work has been done along these lines to show that all the volumes of the Library of Congress could be stored in a 1-cubic-yard box."[15] Kahn and Wiener relate that IBM has developed a memory-storage system using an eight-colored laser beam to store as many as one hundred million bits of information on a square inch of photographic film and that an Air Force scientist has developed with the use of a laser beam a device that could store an entire library during the next fifty years on an 8-by-10-inch piece of nickel foil.[16]

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[12] *Ibid.*

[13] J. G. Kemeny, "A Library for 2000 A.D.," *Computers and the World of the Future*, ed. Greenberger, p. 161.

[14] H. A. Simon, "A Computer for Everyman," *The American Scholar* (Spring 1966), p. 374.

[15] Kemeny, "A Library for 2000 A.D.," p. 166.

The efforts during the next fifty years to organize information so that it is immediately accessible to the individual in whatever form he wishes it may affect the way we think and communicate our thoughts:

> . . . we will have to organize our thinking and work so that it can take advantage of the storage, the processing, and the transmitting powers of information systems. And as the world is made smaller through communication, there will develop a "common" language, both at the technology level and at the user's level—very likely a modified and expanded form of English.[17]

Certainly the problems (costs, complexities of programing, clearance of copyright) and the promises (a global community in which knowledge is available whenever, wherever, in whatever form one wants) are both great. If the problems can be surmounted, then we may see that day, which Gerard believes is not far distant, when any kind of information that can be recorded in books, in pictures, on tape, or in sound "can also be mobilized and presented to a student through audiovisual terminals at his private disposal." The machinery able to do this, he says, exists now.[18]

Communications

We live at a time when such films as the Apu Trilogy, *The Shop on Main Street, Chushingura, Ten Days That Shook the World, Smiles of a Summer's Night, Rashomon, The Bicycle Thief, This Sporting Life,* and *The Pawnbroker* can command appreciative audiences internationally; when airplane travelers' mental maps of the United States have Chicago next to San Francisco and New York next to Chicago; when an airline can refer in an advertisement to "the Atlantic River"; when telephone lines and cables girdle the globe in every direction; when the investiture of Charles as Prince of Wales can be transmitted via satellites and relays 94,000 miles in nine-tenths of a second;[19] when scenes of astronauts and the sounds of their voices come to us live from hundreds of thousands of miles in space; when pictures of Mars can be transmitted from 160 million miles away; when "the remotest country is no further away than a suburban streetcar terminus was to the people who grew up only forty or fifty years ago."[20]

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[16] Herman Kahn and Anthony J. Wiener, *The Year 2000*, p. 100.

[17] C. R. De Carlo, "Educational Technology and Value Systems," *Dialogue on Technology*, ed. Theobald, p. 104.

[18] R. W. Gerard, "The New Computerized Shape of Education," *Inventing Education for the Future*, ed. Hirsch, pp. 104-105.

Growth of media. The time in which we live has been fast aborning: 1839, the daguerreotype; 1844, the telegraph; 1876, the first telephone message; 1877, the phonograph and automobile using gasoline; 1893, motion pictures; 1895, the first wireless message; 1903, the airplane with motor; 1906, transmission of human voice by radio; 1920, regularly scheduled radio broadcasts; 1923, a picture televised between New York and Philadelphia; 1930, the airplane with jet engine; 1932, FM radio; 1939, computer with automatic sequence; 1941, authorization of full commercial television; 1948, LP records; 1965, the first commercial satellite. In less than a century and a quarter the world has been reshaped, its processes of communication forever altered, principally through uses of electronic energy.

To illustrate how rapidly a medium can pervade a society, the editors of *SDC Magazine* point out that in late 1948 there were 36 TV stations and just over a million home receivers in the United States. By 1968, there were 635 commercial stations and 80 million sets, 14.6 million of them designed to receive color broadcasts. In 1950 Americans owned around 100 million auto and home radios and listened to about 2,400 AM and FM stations; by 1968, they owned 282 million sets and listened to over 6,300 stations.[21] Foote reports that, in dollar volume, phonograph records already outsell all trade books published in the United States and that tapes may soon outsell all textbooks.[22]

Kahn and Wiener outline the progress in basic electronic technology since the beginning of the century and call attention to the spectacular acceleration of this progress in the last decade: vacuum tubes, around 1900; first practical transistor, 1948; transistor use and invention of the integrated circuit, 1958; development of integrated circuits, 1960-1963; invention of large-scale integration, or LSI, 1967. LSI, involving the wiring of complete circuits on a silicon chip, will be used to build better computers and will itself be the product of computers.

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[19] T. O'Flaherty, "Mightier Than the Sword," *San Francisco Chronicle*, July 7, 1969, p. 40.

[20] Peter F. Drucker, *The Age of Discontinuity*, pp. 80-81.

[21] *SDC Magazine* (Winter 1969), p. 4.

[22] Nelson N. Foote, "The New Media and Our Total Society," *The New Media and Education: Their Impact on Society*, ed. Rossi and Biddle, p. 414.

As a result of these innovations, Kahn and Wiener predict that within a decade there will be a reduction in the cost of complex circuits of about 100, an increase in reliability of a factor of 100 to 1,000 over what was achieved a decade ago, and a 10,000-fold reduction in the volume required two decades ago for a complex electronic package. They state that at present

> technology permits the manufacture of 100-500 integrated circuits on a silicon wafer an inch in diameter and less than one-hundredth of an inch thick, or complete computer and communication subsystems containing more than 1,000 circuits, each with more than 400 transistors, on half-dollar-size silicon chips less than one-eighth inch thick.

The authors conclude, "the accelerating rate of change in electronics technology makes it almost impossible to say much that is interesting about the electronics technology of the year 2000." [23]

Films. Substantial evidence exists that films are now emerging as a major mass art form, if not, as Harold Taylor claims, "the mass art form of the future." Within the past two years both *Life* and *Time* have included articles on student-made films,[24] while National Educational Television has featured a program on student-made films in its series *The Film Generation.* NCTE, recognizing the growth in both high schools and colleges of courses in film making, has established a Committee on Film Making to accompany its Committee on Film Study. At present, according to the American Film Institute's *Guide to College Film Courses, 1969-70,* 51 schools offer degrees in film, while 168 more offer courses but not degrees, a growth since 1965 of 84 percent. *Life* estimates that 80,000 college students are now enrolled in 3,000 available courses in film and that for every book the average college student reads, he views twenty movies.[25]

About the rising interest in film making, movie critic Judith Crist comments:

> Our eyes have opened to film. In an age of affluence ten-year-olds make 8mm movies replete with cuts, miniatures and judiciously applied catsup blood to out-Bond Flint; and teen-agers turn out animations that make middle-Disney look like the filmstrip artistry that elementary school youngsters turn out daily in more progressive art classes.[26]

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[23] Kahn and Wiener, *The Year 2000,* p. 87.
[24] *Life,* Oct. 11, 1968, pp. 92-99; *Time,* February 7, 1968, pp. 78-79.
[25] *Life,* Oct. 11, 1968, p. 92.
[26] Judith Crist, "Movies," *Look,* Jan. 9, 1968, p. 24.

Both Miss Crist and *Life* agree that for this generation, making the Great American Film has superseded the appeal to prior generations of writing the Great American Novel.

Taylor believes that the combination of low-cost film cameras, mass love of taking and showing pictures, and the unlimited possibilities in new uses of colors, lights, sounds, and stories with multimedia effects centered in projection screens

> all combine to push the film arts deep into the daily cultured life of the masses, that is to say, the middle class and the others. There it will be a participant art, a documentation of life carried out by those who are living it, showing their documents to all the others in a gigantic set of home movies with the world as home.[27]

Television, satellites, and lasers. Both television and film under appropriate conditions can be highly effective instructional media, the folklore of hostile or disbelieving teachers notwithstanding.[28] More important than instructional television to the culture, however, and perhaps to students' learning, is the effect which commercial television has upon society.

Singer attributes to the spread of television a good share in the formation of a global collective unconscious: as television helps us to see each other's humanity, it also inevitably speeds up the process "whereby man becomes a cell in an organism." [29] Tebbel says that there is every indication that television will profoundly alter the future of political dialogue in America, an assertion difficult to challenge when one recalls the Kennedy-Nixon debates or the Presidential use of televised press conferences to rally support for causes.[30] Barnouw suggests that the rise of black militancy coincided with lily-white radio, which had concealed from blacks their invisibility to the dominant society, being replaced by "blatantly white television." [31] Various critics besides McLuhan have attributed to television the decline of bridge playing, baseball, and leisure-time reading; the presence of the generation gap; students' desires for involvement in educational, social, and political processes; public disaffection with the war in Vietnam; and the creation of a re-tribalized global village.

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[27] H. Taylor, "The Arts in Modern Society," *Environment and Change*, ed. Ewald, p. 36.

[28] See, for example, Chu and Schramm, *Learning from Television . . .*, and Reid and MacLennan, *Research in Instructional Television and Film*, both cited in full in the bibliography.

[29] Aubrey Singer, "Television: Window on Culture or Reflection in the Glass?" *The American Scholar* (Spring 1966), p. 308.

[30] John Teobel, "The Making of a President: Politics and Mass Communication in America," *TV as Art*, ed. Hazard, pp. 20-21.

[31] Erik Barnouw, "McLuhanism Reconsidered," *Saturday Review*, July 23, 1966, p. 20.

Television's hold on the society cannot be gainsaid. Witty's studies of televiewing by children and youth showed elementary school children and their parents averaging for over a decade twenty hours a week before the set, while high school students averaged fourteen hours and teachers, twelve—averages that may have risen with the proliferation since 1961 of inexpensive portable sets and the growth of color TV.[32] Anywhere one goes in the country, he can talk about Lucy, the Honeymooners, Rowan and Martin's latest, or Hoss and life on the Ponderosa when neither weather nor politics will serve.

Nor are audiences of twenty million unusual for cultural programs, particularly dramas. NET Playhouse, Hallmark Hall of Fame, Xerox, and other sponsors have artfully presented such programs as *Macbeth, The Tempest, Death of a Salesman, Don Juan in Hell, Our Town, A Doll's House, Hamlet, The Iceman Cometh, A Midsummer Night's Dream*—the list could continue at length. Postman reports in *Television and the Teaching of English* that

> on March 11, 1956, NBC presented . . . *Richard III*. . . . Trendex surveys indicated that at least twenty-five million people saw the play. If these figures are to be trusted, they mean more people saw *Richard III* on one single afternoon than the probable combined total of audiences for stage productions of all Shakespeare's plays since he wrote them.[33]

That the study of television and radio is appealing to increasing numbers of students is documented in the National Association of Broadcasters' eleventh report on radio-television degree programs in American colleges and universities. A total of 5,538 upper-division students in 1968 were majoring in broadcasting at 146 schools, 1,502 more than reported by 131 schools in the tenth report issued in 1967; 1,274 students were studying for the Master's degree at 75 schools, an increase in one year of 11 schools and 145 students; 235 students were in doctoral programs at 18 schools, an increase of 31 students.[34]

With the orbiting in 1958 of the Atlas satellite, permitting the President of the United States to broadcast from space a Christmas message to all the earth, a new era in communications was born, one which "will transform the cultural, political, economic, and even linguistic patterns of our world." [35]

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[32] Paul Witty, *Televiewing by Children and Youth*, Television Information Office, reprinted from *Elementary English*, February 1961.

[33] Neil Postman, *Television and the Teaching of English*, pp. 36-37.

[34] Harold Niven, *Broadcast Education: Eleventh Report, 1968*, p. 1.

After successfully testing other experimental satellites such as Echo, Telstar, Relay, and Syncon, the Communications Satellite Corporation (Comsat) and its foreign partners placed Early Bird, the first commercial satellite, in orbit in 1965 to provide service between the United States and Western Europe. Intelsat II (F-2), positioned in synchronous orbit over the Pacific Ocean in January 1967, was providing service by June between the U.S. mainland and Hawaii, the Philippines, Japan, and Thailand, as well as to the NASA Apollo program. Intelsat II (F-3), placed in synchronous orbit over the Atlantic Ocean in March 1967, was providing service by June between the U.S. mainland, Europe, and several Atlantic-area locations, and to the Apollo program.[36]

The International Telecommunications Satellite Consortium (Intelsat), of which Comsat is the American partner and the controlling interest, is now four years old. It has four Intelsat III satellites in the sky and includes in its network sixty-two nations around the earth. Russia, not a member of Intelsat, announced plans last year for Intersputnik, its own global space-communications network which it hopes will compete successfully against its predecessor, in both income and number of participant nations.[37]

The size and capacity of the satellites have grown and will continue to grow. Whereas the Early Bird satellite could relay 240 telephone conversations simultaneously or one television picture, newer satellites have a capacity equivalent to 1,200 telephone circuits. Comsat plans a domestic satellite system for the United States in the 1970's, one that will use four satellites with combined capacity to relay simultaneously sixteen color television programs, as well as thousands of telephone, telegraph, and facsimile messages. By the year 2000, satellite capacities equivalent to 60,000 telephone circuits are likely, with cost per circuit decreasing as satellite capacities increase. Satellite ground terminals, which tie a satellite into a system of broadband coaxial cable links to offices and homes throughout metropolitan centers, will effectively create a single global megalopolis.[38] Within twenty

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35. Arthur Clarke, *Profiles of the Future,* p. 186.
36. Federal Communications Commission, *33rd Annual Report,* pp. 83-84.
37. *Time,* Sept. 6, 1968, p. 85.
38. *Wall Street Journal* Staff, *Here Comes Tomorrow,* pp. 52-53.

years, it may even be possible to broadcast directly from a satellite to a standard television receiver.[39]

If techniques can be developed to make use of the laser's higher frequencies to transmit sounds and pictures—hundreds of trillions of cycles per second versus billions of cycles per second for current broadband communications—a millionfold increase in communications capacity could result. But for an earthbound network, the problems of transmitting information by laser are formidable: since a light beam will not go through buildings, laser pipes would have to be developed and techniques found for bending the enclosed beams around corners, over mountains, and through valleys.[40] The recent success of scientists at Lick Observatory in bouncing a laser beam 100,000 times brighter than the sun off a sixty-pound, eighteen-inch square reflector on the moon suggests that laser communication may eventually be transmitted, not through pipes, but via satellite.[41]

In addition to relaying telephone conversations and television pictures, satellites will be used for monitoring the weather, navigating ships and planes, making surface maps, detecting forest fires, measuring crop yields, and surveying natural resources.[42] Lasers may contribute, through holography, to three-dimensional television and motion pictures.[43] Fiberoptics, in combination with laser light generation, could conceivably lead to an underground distribution center in which fiber bundles run from a central point along trunk lines to users. One thin fiber entering a home could simultaneously carry telephone, facsimile, and video from laser-central, where program material would be projected on fiber ends.

> It is the laser-fiberoptics combination which could give us practical video-telephones, facsimile-transmitted newspapers, and remote libraries which send books over the line to be printed in the home.[44]

Fuller foresees the use of two-way TV, by means of which "the child will be able to call up any kind of information he wants about any subject and get his latest authoritative TV documentary."[45] These documentaries, each of which might take as long as a year to produce, would be made under the direction of eminent scholars, who would no longer spend time repeating lectures year after year. "I am quite sure that we are going to get research and development laboratories of education where the faculty will become producers of extraordinary moving-picture documentaries. That is going to be the big, new educational trend." [46]

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[39] G. J. F. MacDonald, "Space: Communication, Weather, and Spy Satellites Create New Problems as They Solve Old Ones," *Toward the Year 2018*, ed. Foreign Policy Association, p. 29.

[40] *Wall Street Journal* Staff, *Here Comes Tomorrow*, pp. 55-56.

[41] *San Francisco Chronicle*, Aug. 3, 1969, Sec. A, p. 5.

[42] *Wall Street Journal* Staff, *Here Comes Tomorrow*, pp. 102-103.

[43] Kahn and Wiener, *The Year 2000*, p. 104.

[44] Theodore Gordon, *The Future*, p. 71.

[45] R. Buckminster Fuller, *Education Automation*, p. 43.

Adjunctive future uses of television will include inexpensive video recorders, enabling people to observe themselves in full color and sound immediately following any performance. Consequently, individuals "will be able to derive more value from coaching, to learn faster and better how to shape their own performances—hence, finally become independent of coaching—than ever before. . . ."[47]

Because recorders can preserve television shows for later playback, networks could beam shows appealing to limited audiences at odd hours, such as 4 a.m., and viewers could later watch them at their convenience. Prerecorded tapes or, if present research is successful, pressed discs that would supplant them could be sold by stores or rented by libraries. "This could make available in the stores complex educational courses that require visual demonstrations, as well as hit Broadway shows and other entertainment." [48]

Newspapers, telephones, discs, and tapes. Sarnoff believes that newspapers in the future will no longer be printed in a single location. Transmitted through computers in complete page form to regional electronic printing centers that turn out special editions for areas they govern, newspapers will have local news and advertising inserted on the spot. "Eventually, the newspaper can be reproduced in the home through a small copying device functioning as part of a home communications center." [49] Barry thinks that local and regional publications, experiencing a rapid growth because of web-offset and gravure methods of printing, "may occasion a vigorous come-back for local journalism and a healthy check on monopoly." [50]

Carpenter sees in the near future an increased use of telephones for instruction. Voices of distinguished lecturers from anywhere in the world "can be brought into an active learning situation" when immediacy or simultaneity are important to instruction.[51]

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[46] *Ibid.*, p. 36.

[47] Foote, "The New Media and Our Total Society," p. 389.

[48] *Wall Street Journal* Staff, *Here Comes Tomorrow*, pp. 149-50.

[49] D. Sarnoff, "No Life Untouched," *Saturday Review*, July 23, 1966, p. 22.

[50] Sir Gerald Barry, "Mass Communications in 1984," *The World in 1984*, ed. Calder, p. 157.

If a truly integrated communications network becomes a reality by 1980, an individual in the society "could have at his disposal a private telecommunications center which would incorporate a television and tape recording system, a two-way picturephone, a high-speed electronic printer, and a combined computer and display unit." This center would serve all communications functions from entertainment to the automatic remote transaction of personal business.[52]

Hult thinks that the home as the center for communications of all types could eventually spell the end of schools, if facilities and techniques can be developed, suitable employment found for those displaced, and "resistances from the powerful lobby of teachers" overcome:

> There seems to be no technological reason why any educational technique could not be automated and made more efficient through video, audio, and data-link communications, with appropriate coupling to large computers. If broad-band communication coupling is required for every home . . . two-way circuit capacity for bringing education directly to the home would be available. Education could then be provided not just for the young but also for those desiring reeducation in our rapidly changing society. Such an educational system could be adapted to any teaching technique, curriculum change, or educational innovation. . . . It could be made a continuous, life-long process . . . adaptable to each individual according to his capabilities.[53]

Magnetic storage, tapes, discs, and microfilms permit an almost unlimited and timeless storage of experience. For some time discs and tapes have permitted us to recreate part of the past by preserving and allowing us to re-hear events long past and the voices of those now dead—poets, singers, Presidents, actors, military leaders. Now, with the technique of computers and magnetic digital storage,

> it will always be possible to recreate the original recording of the experience in fresh media. This suggests a future that will have a totally new way of looking at the past and, therefore, at its own present and future.[54]

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[51] C. R. Carpenter, "Toward a Developed Technology of Instruction 1980," *Campus 1980,* ed. Eurich, pp. 248-49.

[52] T. Smith, "Communications," *Designing Education,* No. I, ed. Morphet, p. 177.

[53] J. L. Hult, *Satellites and Technology for Communications: Shaping the Future,* pp. 19-21.

[54] De Carlo, "Computer Technology," *Toward the Year 2018,* ed. Foreign Policy Association, pp. 102-103.

The global village. Most forecasters agree that modern forms of communication are creating a world in which time and distance are irrelevant, a world in which information is being transmitted almost instantaneously. Not all agree, however, on what consequences await communications' open flow.

Drucker believes that new media have created a world economy, one in which expectations, responses, and behavior are all conditioned by everyone's knowing how everyone else lives.[55] Kean thinks that global television will augment tensions between haves and have-nots and put an end to economic imperialism:

> The great danger in the current rich/poor, North/South, Caucasian/non-White gap is that the poor now realize they are poor. The pride of Western technology will deal a deathblow to economic imperialism. The Western world has beamed the news of its material achievements around the world. Self-consciousness, expectations and a profound sense of cultural injustice have thus been heightened in "have-not" countries; without proper relief, the conditions for revolution become intensified.[56]

Despite the number of nation-states that have come into being during the past twenty years, the central fact of our times is "the painful birth pangs—unheralded, unanticipated, and to many people unseen—of a new world society of interdependent nations." This world society is a consequence of

> (a) worldwide interest in simple survival; (b) worldwide aspirations that cannot be . . . fulfilled without collaborative actions and transactions; (c) the "mobilectic" revolution that is shrinking the earth . . . by contracting the time needed to move people, things, information, and energy across space; (d) techniques of "informal penetration" and "infusive diplomacy" that make it impossible to divide the world into old-fashioned spheres of influence and that create spheres of mutual interest even among adversaries; and (e) the growing influence of world-oriented megalopolitans.[57]

Toynbee argues that in our political and economic life today, we need institutions on a worldwide scale, but ones which will operate through personal relations. He sees the frustrations and malaises of our time as being the result of a diminution of personal relationships and concomitant growth of impersonal institutions. "What we are missing now in public affairs is the village—the largest-scale community which can run its operations on a basis of personal relations."[58]

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[55] Drucker, *The Age of Discontinuity,* p. 80.

[56] Richard Kean, "The Dialogue Community: The University in a Cybernated Era," *Dialogue on Technology,* ed. Theobald, p. 55.

[57] Bertram Gross, "The City of Man," *Environment for Man,* ed. Ewald, p. 141.

Perhaps the satellite communication networks will create the village Toynbee has in mind—one in which "we meet and talk, instead of commissioning our respective lawyers to write formal letters to each other on our behalf."[59] Clarke observes that, psychologically as well as physically, there are no longer any remote places on earth, that when a friend leaves for what was once a far country with no intention of returning, we do not feel the sense of irrevocable separation that saddened our forefathers:

> We know that he is only hours away by jet liner, and that we have merely to reach for the telephone to hear his voice. And in a very few years, when the satellite communication network is established, we will be able to see friends on the far side of Earth as easily as we talk to them on the other side of town. Then the world will shrink no more, for it will have become a dimensionless point.[60]

Reflecting upon what effects the development of electronics, of automation, of cybernation, and of the whole complex of control systems will have, Boulding foresees all existing political and economic institutions being modified by new technology, but in directions hard to predict. The ultimate results he believes will be benign, but in the interim between *now* and *then*, he can only conclude that

> The network of electronic communication is inevitably producing a world superculture, and the relations between this superculture and the more traditional national and regional cultures of the past remains the great question mark of the next fifty years. . . .[61]

Biological "Advances"

During the next thirty years, the social fabric of the nation may be greatly altered, if not tattered, by widespread application of biomedical techniques for controlling, altering, and aborting human life. Mind alteration through psychedelic drugs, organ transplants, artificial insemination, intrauterine devices, oral contraceptives, and electronic heart pacers—to name just a recent few such techniques—are now widely familiar to the public, their long-range effects on behavior and values just beginning to be understood.

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[58] Arnold J. Toynbee, "The Coming of the Worldwide City," *Think* (July-August 1968), pp. 11-12.

[59] *Ibid.*, p. 12.

[60] Clarke, *Profiles of the Future*, p. 114.

[61] K. Boulding, "Expecting the Unexpected," *Designing Education for the Future*, No. I, ed. Morphet, p. 209.

To illustrate the consequences to human values the development of one technique has had in a short time, one need only trace the history of the first heart transplant from 1942 to 1968. In 1942 Gibson and Medawar found that a man receiving skin grafts becomes extremely sensitive to grafts of other organs from the same donor, an indication that immune responses could be regulated. In 1954 the first successful kidney transplant between identical twins occurred; in 1958, the first successful graft between non-twins; in 1964, the first animal-to-man graft; in 1968, the first successful heart transplant.[62] With that event the accepted distinction between "dead" and "alive" began to be seriously challenged: one could be "dead" though his heart was still beating. Consequently, doctors were increasingly forced, not without misgivings, to define death as the absence of electrical activity of the brain as determined by an electroencephalograph rather than the absence of heart functioning as determined by a stethoscope.[63] Further, with that even the age-old use of the heart as the symbol for love and the seat of passions began to be quaint, with almost certain loss to literature if not to St. Valentine.

While conceding that biological engineering, as with cybernation and social engineering, is not a completely new activity, Michael believes that what is to come in these technologies "presage profound confrontations for the conduct of society and for the purposes and processes of education" and that the expansion during the next two decades of scientific understanding in biology will correspond "in seminal and radical developments to physics during the early decades of the twentieth century."[64] Taylor asserts that "we stand on the threshold of a new era in understanding the mind" and that neurophysiology may provide the area of greatest advance in biology during the next half-century:

> Three major areas of excitement and progress can be detected. . . . First, there is a growing power to intervene in the non-intellectual functions of the brain: a growing ability to alter moods and emotional states—a development which is based on the realization that the brain is not simply an electrical or computer-like mechanism, but a complex chemical system as well. Secondly, a spirit of extreme optimism has sprung up concerning the possibility of discovering the nature of memory. Finally, there is a guarded belief that one may be able to effect considerable improvements in the level of intelligence of future generations. . . .[65]

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[62] Taylor, *The Biological Time Bomb*, p. 61.
[63] *Ibid.*, p. 114.
[64] Donald N. Michael, *The Unprepared Society*, pp. 56-57.
[65] Taylor, *The Biological Time Bomb*, p. 125.

Discoveries by psychologists, chemists, and neurophysiologists about rat-brain chemistry will not deviate widely from what will eventually be discovered about the chemistry of the human brain, Krech maintains; therefore, in the near future educators "may well be talking about enzyme-assisted instruction, protein memory consolidators, antibiotic memory repellers, and the chemistry of the brain."[66]

In short, there appears to be general agreement among scientists that biology and its offshoots and allies—biomedicine, biophysics, biochemistry, bioengineering, psychobiology, etc.—are spawning and will continue to spawn discoveries and applications of great import to man's future. It is extremely difficult, however, for a layman to sift from this rapidly expanding and complex scientific field those discoveries and applications having most potential significance to the welfare of society and to the processes of education. Two caveats are therefore in order: from perusing the brief descriptions of biological innovations which follow, the reader may discover that other equally important discoveries have inadvertently been overlooked; too, he may find that the process used to winnow elements—isolating those most easily described by themselves—has seriously distorted how these elements, in their application, often interact with other elements in complementary fashion.

Electrical alteration of the mind. Quarton reports that electrical stimulation of the brains of animals has produced alertness, drowsiness, sleep; arrested ongoing behavior; modified the urgency of biological drives; increased and decreased aggressive behavior; caused the animals to continue to press a bar indefinitely when pressing either continued pleasurable stimulation or halted unpleasurable stimulation; caused the animals to alter mood. "In the last few years experiments with implanted electrodes in humans have shown that most of the effects obtained with other mammals are quite feasible in humans."[67]

In 1965 Ervin and Mark developed a portable electronic device about the size of a transistor radio, capable of subduing even the pain of cancer. Electrodes are inserted into the thalamus through an opening drilled in the skull, and nine-volt, thirty-cycles-per-second current can be administered by pressing a button. Patients, who report no side effects, carry the box in the pocket of their dressing gown or pajamas and turn it on whenever pain occurs.[68] Since 1965, electrodes have been placed in human spinal columns to relieve intractable pain. For patients sensitive to drugs or anesthetized for long periods during transplant operations, electrodes have been used to send minute surges of anesthetizing current across their skulls. At present, experimental research is taking place on electrical stimulation of the brain to move muscles paralyzed by stroke and to enable blind persons to "see" patterns of light.[69]

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[66] David Krech, "The Chemistry of Learning," *Saturday Review*, Jan. 20, 1968, p. 48.

[67] G. C. Quarton, "Deliberate Efforts to Control Human Behavior and Modify Personality," *Daedalus* (Summer 1967), pp. 844-45.

Prehoda says that scientists in the Soviet Union have reported using electrodes placed on the eyelids and behind the ears to induce sleep. Low frequency pulses are applied to the cerebral cortex, allowing, claim the investigators, the individual to crowd a full night's sleep into two or three hours. However, attempts in this country to duplicate Soviet procedures for electronarcosis have not clearly established the amount of sleep reduction.[70] Ostensibly more successful, though not electrically induced, was the pioneer effort in this country to lull a person to sleep by having him lie in a saline-water solution kept at body temperature to prevent his becoming chilled. In 1962 a 92-inch fiberglass tub called the "Aquarest" was developed by Clark T. Cameron, who claimed that his experiments indicated warm saline-water immersion permitted required sleep to be reduced from eight to four hours a day.[71]

Surgical alteration of the mind. Rarely used now for performing leucotomies, surgery is being used for treatment of selected cases of temporal lobe epilepsy, and of lesions of the central nervous system or the endocrine system which lead to abnormal behavior. According to Lewis, the future role of surgery in the treatment of mental illness will depend upon the discovery of further such somatic causes. Since these may not be macroscopic, techniques of implantation and neuronal stimulation may be necessary.

> Such techniques are at present for the most part restricted to the laboratory, and ethical considerations have told against their bold application to human subjects. In the next twenty years, however, laboratory studies may well have justified the wide employment of

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[68] Taylor, *The Biological Time Bomb,* p. 148.

[69] David Perlman, "Electricity—A Vital Juice," *San Francisco Chronicle,* Feb. 28, 1969, p. 6.

[70] Robert W. Prehoda, *Designing the Future,* p. 196.

[71] *Ibid.,* p. 195.

> these procedures in some forms of mental disease, for diagnostic as well as therapeutic purposes.[72]

Pharmaceutical alteration of the mind. Quarton believes that during the next three decades many new drugs will be developed both by academic institutions and by private drug houses, and that advertising will continue to promote sales by exaggerating need for pharmaceuticals. The new drugs, Quarton assumes, will be accepted by at least parts of the society, and control of their use will be, as now, a serious social problem. Because they can be used easily, drugs will quite likely "constitute the most common technique for manipulating behavior with full social approval—for instance, increasingly in the handling of behavior deviants." [73]

LSD and marijuana, Michael claims, "are only the most publicized forms of an endless variety of natural and man-made chemical agents that alter emotional states." He reports that research is taking place on chemicals that appear to improve memory in the aged, that appear able to erase memories, and that increase alertness and facilitate learning.[74]

In 1966, Abbott Laboratories released with much publicity a new drug with the trade name *Cylert*, made of magnesium pemoline. Prehoda states that rats given Cylert learn four or five times faster than untreated rats and that preliminary experiments on humans are encouraging. Magnesium pemoline apparently increases the rate of RNA (ribonucleic acid) synthesis by increasing the activity of an enzyme, RNA polymerase.

> An increase in the rate of RNA synthesis within brain cells might improve learning and memory by speeding the electronic-biochemical process which causes information or thoughts to be transferred from temporary electronic retention to permanent molecular storage in new RNA molecules.[75]

Work is going on in attempting to transfer memory by making an extract from the brain of a trained rat and injecting it into the brain of an untrained rat. This work, begun by McConnell at Michigan with planaria, has produced conflicting reports, most of them negative. Nevertheless, the experiments continue, and a number of brain researchers in the last few years have moved "from the position of stiff-necked disbelief to the position of 'well, maybe—I don't believe it, but well, maybe.' " Krech notes that a rat has a highly developed brain, "not too different in complexity, in differentiation, and in organization from our own."[76]

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[72] Sir Lewis Aubrey, "Changes in Psychiatric Methods and Attitudes," *The World in 1984*, ed. Calder, p. 31.

[73] Quarton, "Deliberate Efforts to Control Human Behavior," p. 849.

[74] Michael, *The Unprepared Society*, p. 60.

[75] Prehoda, *Designing the Future*, p. 275.

Current research in molecular and developmental biology suggests that administering growth hormones to the fetus during the period of neuron reproduction may increase an individual's problem-solving ability. Professor S. Zamenhof and his team of researchers at the University of California have injected rats and mice from the seventh to the twelfth day of their pregnancy with pituitary growth hormone. Upon killing the offspring and examining their brains, the researchers have found a significant increase both in brain weight and in the ratio of neurons to the supporting glial cells. Of greater significance, according to Taylor, have been the researchers' discoveries that the density of cells in the cortex, where reasoning takes place, has been increased and that the number and length of the dentrites, or branching interconnections, has become greater.[77] Administering growth hormones to human fetuses may produce children of increased intelligence.[78] Prehoda believes that Dr. Zamenof's technique or some comparable biochemical therapy could be widely available for pregnant women within ten to twenty years.[79]

Gordon claims that only clinical verification of safety is inhibiting the wide use of existent drugs capable of producing euphoria or gloom, eliminating inhibitions or response to stimuli, or removing sense of time. Once such verification is obtained, the drugs will come into increasing use, Gordon believes. "They will probably be available without prescription and will be non-narcotic. They will be socially accepted, as sleeping pills are today."[80]

Taylor anticipates the time when a person's moods will be governed entirely by pills rather than by his own nature. Recognizing that a human being protected from genuine emotion may be in some sense impoverished, and that humanists may feel a loss involved in a person's evading moods furnished by life experiences, Taylor nevertheless rhapsodizes about the benisons of pills:

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[76] David Krech, "Psychoneurobiochemeducation," *Phi Delta Kappan* (March 1969), p. 372.

[77] Taylor, *The Biological Time Bomb*, pp. 144-45.

[78] Werner Z. Hirsch, "Educational Innovations: Process and Prospects," *Inventing Education for the Future*, ed. Hirsch, p. 8.

[79] Prehoda, *Designing the Future*, p. 278.

[80] Gordon, *The Future*, p. 10.

> . . . it could be argued that even the most cloistered and unadventurous individuals will be able to experience pinnacles of emotion they would never otherwise have known—the rapture of gazing on a new ocean for the first time, the utter abandonment of the dark night of the soul. Such individuals might be richer, better able to appreciate the feelings of others, thanks to having had similar experiences themselves.

Following his perhaps hyperbolic passage, the author adds—almost as an afterthought—"Socially, however, it may be disturbing not to know for sure if a person is genuinely himself. . . ." [81]

In a passage antithetical to that quoted from Taylor and probably just as overstated, Bacq predicts that by as early as the Orwellian year of 1984, minds and bodies that function naturally will be rare, "so rare that they will look abnormal in a drug-conditioned society." The consequences, he believes, will be the loss of "sharp and powerful individualities which have built mankind" and the substitutions for them of "a slow tide of eroded characters and castrated personalities." [82]

Genetic and other forms of engineering. Edsall points out that some eminent biologists, including Joshua Lederberg, have proposed programs of "genetic engineering" by which undesirable genes could be modified in, or desired genes introduced into, people suffering from genetic abnormalities. Though this can be done in bacteria by transformation or transduction, the techniques cannot be simply copied for higher organisms at the present time. However, Edsall believes that there is a real possibility in the near future of developing techniques for modifying or replacing human genes through the aid of tissue-culture techniques and their genetic manipulation. "How such things may be done wisely, and without harmful side effects, if indeed we do learn to do them at all, is a matter for earnest and careful thought. The possible may become the actual sooner than we think." [83]

Already, according to Aubrey, technological advances in methods of separating metabolic products in blood, urine, and other body fluids are making possible the recognition of inborn errors of metabolism which, untreated, lead to mental retardation. "Phenylketonuria and galactosaemia are instances of how discovery of the biochemical anomaly has led to dietetic measures which can prevent or lessen the intellectual impairment." Aubrey predicts that as more metabolic anomalies continue to be separated from the general run of mental deficiency, a wider list of preventive measures will be prepared, with even schizophrenia and related mental disorders eventually being prevented.[84]

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[81] Taylor, *The Biological Time Bomb*, p. 130.

[82] Z. M. Bacq, "A Vicious Circle of Chemicals against Chemicals?" *The World in 1984*, ed. Calder, p. 25.

[83] J. T. Edsall, "Biology and Human Values," *Knowledge and the Future of Man*, ed. Ong, pp. 171-72.

In summer of 1969, newspapers reported a technique for predicting Mongolism in sufficient time for the mother to abort her fetus. The technique involves extracting amnionic fluid, in which can be found cells peculiar to the abnormality if it exists. More recently newspapers reported a simple blood test which has enabled researchers to predict correctly a child's sex early in a pregnancy. White cells in the mother's blood bearing the XY chromosome invariably indicate the birth of a male child. If sex-linked defects are suspected because of family histories—hemophilia, gargoylism, hydrocephaly—a more complicated analysis of cells from the mother's amnionic fluid is made.[85]

In 1958, Drs. Iizuka and Sawada reported two dozen children had been successfully produced through insemination of stored sperm. Since that time, clinicians have reported successful pregnancies from male sperm frozen for up to two and one-half years, with no reason for researchers to believe that suspension of the life of the sperm cannot be prolonged indefinitely.[86] As a consequence of this technique and that of artificial inovulation, not only is genetic improvement of human stock possible (one can imagine a George Eliot giving birth to children of Shakespeare's frozen sperm), but, as Taylor observes, the procedure of sexual enjoyment can be wholly divorceable from the procedure of procreation. "Thus it becomes possible to introduce an eugenic policy without interfering in people's choice of mate or a marital partner." [87] With the development of artificial placentae, which may be only a matter of time, the travail of childbearing can be spared women, sexual joy can be unstinting, and *Brave New World,* in which *mother* is an alien term, will be a quantum jump closer.[88]

Classification of psychological types should be on a scientific basis by 1984, according to Brain. Inborn temperamental differences will be measured by tests which reveal not only basic factors influencing personality but probably their genetic origins and physical correlations. Such knowledge, Brain asserts, should be of great value in many fields, especially education, "where there should also be advances based on a better understanding of the psychology of learning." [89]

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[84] Aubrey, "Changes in Psychiatric Methods," pp. 28-29.

[85] D. Perlman, "Predicting Babies' Sex," *San Francisco Chronicle,* July 8, 1969, p. 4.

[86] Taylor, *The Biological Time Bomb,* p. 34.

[87] *Ibid.,* p. 158.

[88] *Ibid.,* p. 39.

Krech maintains that it is perfectly reasonable to suppose that we will be able to find specific biochemical boosters and biochemical inhibitors for different kinds of memories and imagery, or for different kinds of personality or temperament traits.[90] However, Krech says, we do not know yet what kind of educational environment can best develop the brain chemically and morphologically, what kind of stimulation can make for an enriched environment, or what educational experiments can potentiate the effects of drugs. Therefore, we need a new area of collaboration in basic research that will join together educator, psychologist, and neurobiochemist to produce the psychoneurobiochemeducator, an expert capable of administering precisely unto the child:

> Tommy needs a bit more of an immediate memory stimulator; Jack could do with a chemical attention-span stretcher; Rachel needs an anticholinesterase to slow down her mental processes; Joan, some puromycin—she remembers too many details, and gets lost.[91]

With increased understanding of the genetic code and the nature of the aging process, dramatic extensions in human life spans are possible before the end of the century. Prehoda thinks that we may be able only to slow down biological aging, doubling or tripling the average life span unless we discover one major correctable and reversible cause of senescence, in which case the life span might be extended anywhere from 500 to 1,000 years or more.[92] Feinberg sees a serious possibility that aging will eventually be eliminated altogether and that human beings will be able to maintain themselves indefinitely at whatever biological age they choose. If not only aging but diseases in young and old could be eliminated, "the sources of death would be essentially reduced to accidents and individual choice." [93] Such discussion annoys if not disgusts biologists like Ehrlich who insist that birth control must precede or at the very least accompany death control if mankind is not to be destroyed by rampant growth of population.[94]

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[89] Lord Brain, "Knowing Our Minds Better," *The World in 1984,* ed. Calder, p. 10.

[90] Krech, "Psychoneurobiochemeducation," p. 374.

[91] Krech, "The Chemistry of Learning," p. 60.

[92] Robert Prehoda, "Our Children May Live to Be 200 Years Old," *The Futurist* (February 1969), pp. 4-5.

[93] Gerald Feinberg, *The Prometheus Project,* p. 82.

[94] See *The Population Bomb,* pp. 92-95, for a sample of Ehrlich's annoyance.

Since every cell in the body of any organism carries all the information necessary to construct whole organs or the body itself, the discovery by geneticists of how to release this information in a controlled manner could eventually permit, not only the growth of new organs to replace old or defective ones,[95] but the cloning or duplicating of individuals from one of their cells. According to Taylor, J. B. S. Haldane—the late, famed Scottish geneticist—regarded cloning people as a definite possibility. In 1967 Lord Rothchild, an internationally known Cambridge physiologist before becoming a businessman for a chemical firm, told scientists at the Weizmann Institute of Science in Israel that he regarded cloning people as a near possibility.[96]

Summary. With reference to behavior-control technology, the most efficient utilization would involve mixing techniques, Quarton claims.[97] The current state of the "art" is that it is possible to alter behavior by drugs, neurosurgical intervention, and systematic stimulus control. By the year 2000, drugs and other behavior controls may be available to produce personality changes at will.[98] Though techniques are crude at present, not necessarily reliable, and not based on full theoretical understanding of underlying mechanisms, "since they are at least partially effective even without this full understanding, we should not delay an evaluation of the social implications until complete understanding is achieved." [99]

With regard to genetics, too little is known at present, Edsall says, for one to offer wise and practicable plans for improving the quality of the human race. In view of present ignorance, one should neither exaggerate the possible good nor concentrate too heavily on intelligence as a quality to be promoted by genetic selection: "Kindheartedness and generosity of spirit are at least as important for a good world, and the best parents do not always have the best brains." [100]

What is most apparent is that the broad field of biology, including such subdisciplines as biomedicine, genetics, geriatrics, bioengineering, biochemistry, and biophysics, will put to the test during the next thirty years many of man's most revered values about the sanctity and worth of individual human life. Even though they are not found wanting except by the most pragmatic and Machiavellian of social and political standards, many of these values may cease to be respected as viable guides to ethical conduct.

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[95] Taylor, *The Biological Time Bomb*, p. 70.

[96] *Ibid.*, pp. 25-28.

[97] Quarton, "Deliberate Efforts to Control Human Behavior," pp. 846-47.

[98] Kahn and Wiener, *The Year 2000*, p. 349.

[99] Quarton, "Deliberate Efforts," pp. 837-38.

[100] Edsall, "Biology and Human Values," pp. 170-71.

Values

Implicit in the discussion of such topics as employment and leisure, biological advances, and urbanization in chapters 3 and 4 is the notion that pervasive technological change is invariably accompanied by changes in societal values. These changes and their potency in regulating human affairs are extremely difficult to predict, for, as Rescher notes, the scientific study of values is a recent and still underdeveloped discipline, one lacking at present predictive instrumentalities.[101]

We do know, at the least, that scientific discoveries and their technological implementation are not one and the same, that wholesale implementation requires societal acceptance, which in turn is contingent upon values widely operative in the society. Undeniably these values both modify and are modified by technological change: the "good life" as envisioned by today's middle-class suburban commuter has in it technological products (if not pleasures) undreamt of in the philosophy of his agrarian, God-fearing grandfather. Too, the diffusion in modern society of sophisticated media of communication, themselves exemplars of technological change, have made easier the manipulation or elimination of old values and the creation and inculcation of new ones.

An illustrated advertisement for *The Mind,* Volume 1 in the Life Science Library published by Time-Life Books, appeared as an insert in *TV Guide*, August 2-8, 1969. Illustrative of how a medium can help prepare citizens to accept technological changes that may necessitate changes in societal values, the advertisement is a paean to "scientific" control of the mind. It informs the reader that the time of the "supermind" looms as a distinct possibility, assuring him that in the near future the power of the mind can be increased and its errors modified with "scientific certainty," equating in excitement the "conquest of inner space" and inter-stellar exploration.

The advertisement devotes itself to informing the reader about the mysteries of the mind and the chemical and electronic "miracles" performed daily on the brain—the former methodically surrendering their identity to science, the latter promising the advent of dramatic therapeutic and educational change. It portrays physical and chemical treatments likely to displace such conventional psychiatric and surgical procedures as shock therapy and prefrontal lobotomy; too, the reader will come to know the alcoholic as victim of biochemical imbalance, a condition remediable through medication. And it promises a look at teaching machines that stimulate all senses simultaneously.

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[101] N. Rescher, *The Future as an Object of Research,* p. 10.

Also promised is a glimpse of a "new therapy"—the use of regulated electrical impulses (as, for example, when applied to the thalamus to mediate dramatic changes in personality, including sexual modification).

The Mind is announced as an achievement which the copy and illustrations of the advertisment are inadequate to describe; the reader is exhorted to borrow a copy of *The Mind* for ten days, sans obligation.

Work. At present a revolt against what they regard as Madison Avenue techniques of creating pseudo materialistic values is being led by a minority of the young; ironically their ultimate success in redirecting the society away from things and toward people and their intrinsic worth may be abetted by some forms of the technology they seemingly abhor. With automation, the traditional equation between man hours, production, and income is being rendered senseless.[102] In place of jobs and work, many economists foresee the growth of service industries, industries dedicated to the welfare of others:

> It is the "object-oriented" work in our society that is being replaced by mechanization, automation, and cybernation. In the years ahead, it is the "people-oriented" type of work that is likely to increase. . . . Let the machines produce objects, let people become more concerned with people.[103]

Yet, as we have noted earlier, both service occupations and leadership roles in the society require levels of intelligence and education either not possessed or not attainable by all those displaced by machines. As a result, large numbers of persons are being bereft of values long associated with work, values having to do with self-identity (the response to "What do you do?") and self-dignity (the pride in "I owe nothing to no man"). In their place some have called for the creation of new myths having to do with leisure and abundance,[104] while others have called for a rejuvenation of crafts to occupy workers' time, provide them creative outlets, and keep them mentally alert.[105]

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[102] Ad Hoc Committee, "Triple Revolution," reprint from *Liberation* (April 1964), p. 5.

[103] "The Theory of the Leisure Masses," *Kaiser Aluminum News,* V (1966), 15.

[104] W. H. Ferry *et al., Cacotopias and Utopias: A Conversation,* p. 15.

[105] Dennis Gabor, *Inventing the Future,* pp. 138-40.

What is clear is that we are not clear about the personal and social effects which elimination of unskilled, semiskilled, skilled, and middle-managerial work will have; nor have we found suitable replacements for their values. After recognizing the importance of work in binding us to reality, Bell asks, "What happens, then, in a society where work becomes less important to many people, and intellectual work becomes concentrated in a very small minority?" [106] "What is there to substitute for [work]?" de Grazia inquires:

> Work used to be, and still is, good for you, a remedy for pain, loneliness, the death of a dear one, a disappointment in love, doubts about the purpose of life.
>
> . . . The men who go to work in the morning and come home at night are still the pillars of the nation. If these pillars tumble, the country has lost an important part of its cohesion.[107]

Americans are not easily relinquishing their cultural orientation toward work, advancement, and achievement. In a recent *Time*-Louis Harris Poll, 79 percent of 1,600 representative U.S. citizens interviewed assented to the statement "Hard work pays off." [108] By the year 2000 this attitude may be rejected for reasons Kahn and Wiener list, most of them having to do with the easy availability of money in the ever more affluent, affluent society.[109] However, the issue is the quality of life of those who do not work, not the quantity of income they receive. And this issue is far from being satisfactorily resolved:

> We simply have not yet learned how to think in terms of the new world which already exists all about us and is rising to greater heights even as we meet here. In the economy, for instance, we are trying to solve the problems of automation merely by deferring them; that is the true significance of talk about shorter work weeks, shorter work days, early retirement, and the like. We simply do not know what to make of what is happening to us. We need to think in terms of changes in kind, not merely changes in degree.[110]

The individual and the group. Despite "individualized instruction" in education (a process which itself may become impersonal and manipulative), the United States promises to be increasingly an urbanized society in which machines replace most muscles and minds, in which population grows steadily, and in which goods and services—health, education, transportation, etc.—have to be purchased communally. Such a society will almost perforce diminish the worth of the individual; and the corporate will—defined perhaps by a handful of "benign" advanced planners—will be ascendant. "What is the meaning of free choice, when so many choices are essentially or necessarily group rather than individual?" [111]

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[106] D. Bell, "Alternative Futures," *Daedalus* (Summer 1967), p. 668.

[107] S. de Grazia, "The Problems and Promise," *Environment and Policy*, ed. Ewald, p. 120.

[108] "Changing Morality: The Two Americas," *Time*, June 6, 1969, p. 26.

[109] Kahn and Wiener, *The Year 2000*, pp. 200-201.

[110] Murray Tondow, "Man and Machine—Machine and Man—The Individual's Prerogative," *Symposium II*, p. 65.

Prostheses in the body, new drugs, and man-like robots will raise questions about what it is to be—and to feel like—a human being.[112] Feinberg believes it imperative that we establish now our ultimate goals as a species so that we can decide rationally what forms of individual activity society should rule inadmissible. Only in the light of such goals can we decide whether to permit as an alternative to ordinary life the systematic use of drugs or pleasurable electrical stimulation of the brain, stimulation which "would produce sensations comparable to, or even stronger than, those produced indirectly in ordinary life by such activities as eating, sex, hearing music, etc." [113]

According to Michael, the researches of Penfield, Olds, and Delgado have already demonstrated that electrical stimulation of the brain through implanted electrodes can induce terror or ecstatic pleasure and that behavior can be controlled, new behavior taught, and memories repetitively elicited. New ethical issues arise then, not only about the use of electrical stimulation by those voluntarily seeking pleasure, but also about its employment by an "enlightened" power seeking to control involuntarily those who are "antisocial":

> Who is to decide whether or not to use such devices to retain antisocial behavior into more acceptable forms? . . . the question of what is "antisocial" becomes much more pressing simply because we know we can . . . change the behavior. Who decides then what is antisocial behavior and who decides when it must be changed?[114]

Goldberg fears that the control of the society by an élite group of planners, whom he chooses fittingly to call the ***kybernetai***, or helmsmen, will threaten the autonomy of the individual; for effective control necessitates maximum predictability of the behavior of people, processes, and things. Deviancy and spontaneity, which make prediction and total control impossible, are intolerable in such a society:

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111. Bell, "Alternative Futures," p. 668.
112. Kahn and Wiener, *The Year 2000*, p. 212.
113. Feinberg, *The Prometheus Project*, p. 93.
114. Michael, *The Unprepared Society*, p. 62.

> How natural . . . to slip into measures designed to keep in line potential noncomformists or deviants, the idiosyncratist, the temperamentalist, the maverick, the kook. . . . How natural . . . to fall into coercion for uniformity and conformity. Benevolent coercion it may be, to be sure. And, often apparently so laudable, so commendable . . . so humanitarian. . . . Yet underneath, the mailed fist! . . .
>
> . . . I would be willing, almost, to advance the thesis that, in a cyber-culture, in a culture of electronic, molecular, and biogenetic technology, the indirect threats to personal human values making for the dignity of the individual are far more ominous than are the direct and explicit threats. And the more altruistic the professions of the *kybernetai*, the more serious the threat of implicit coercion destructive of the human values that should make for the dignity of the individual around 2000 A.D.[115]

The central problem, as Goldberg sees it, is how to retain the power of control, now and in the future, with people themselves, most of whom have not considered the consequences of control being assumed by the small élite Michael believes will inevitably manage the society.[116]

As has been indicated, the combination of molecular, electronic, and biogenetic technology may be ill-used for controlling behavior and thought, with concomitant diminution of individual dignity and worth. Prehoda foresees, for example, the time when psycho-cybernation may not even require electrodes inserted in the brain. Already electromagnetic fields adjacent to the skull have stimulated in human subjects visual and other sensory effects. Since brain tissue is apparently conductive, "properly designed magnets might be able to facilitate the exploration of the precise areas and thought patterns." A "brain-computer symbiosis," fulfilling the science fiction dream of instant-learning machines, may eventually be possible, Prehoda believes. Such a symbiosis would probably require many micro-electrodes being permanently implanted in the brain and then connected to an external socket "which might cover a large portion of a synthetic skull replacement." The relationship with the computer, which might be plugged in periodically, need not be permanent.

> A direct linking of human intelligence with electronic systems might permit computer-stored information to be fed directly into the brain. Equally important, human knowledge might be quickly transferred to the computer's memory system.[117]

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[115] Maxwell Goldberg, "The Structure and Problems of Human Values: 2000 A.D.," *Symposium II*, pp. 77-78.

[116] *Ibid.*, p. 80.

[117] Prehoda, *Designing the Future*, pp. 276-77.

Deciding (by whom?) whether to permit such a symbiosis even if it were possible and, if allowed, determining (by whom?) what should be learned and to what ends are ethical issues of the first magnitude.

Awareness of the need to explore the ethical aspects of experimentation with human subjects in both the social and the medical sciences led the American Academy of Arts and Sciences to devote the Spring 1969 issue of *Daedalus* to that topic. Editor Stephen Graubard wrote in the preface to the issue:

> There is reason to believe that ethical issues will increasingly preoccupy social scientists . . . the school and the ghetto are two of the more obvious sites for experimentation with human subjects, and their inhabitants may need to be "protected" in very much the same way that hospital patients and experimental subjects in medical research now are. Alternatives will have to be weighed so that the needs of society are taken into account while the rights of the individual are not neglected.[118]

The concern is justified and timely. Not far behind us are concentration camps like Auschwitz and medical experimentation on involuntary human subjects. In July 1969, a story copyrighted by the *New York Times* reported that poorly designed and inadequately supervised drug tests and blood plasma operations on penitentiary prisoners in three states have resulted in hundreds of inmates in voluntary programs becoming seriously ill and an undetermined number of them dying. "The Federal Government and the pharmaceutical industry—the two forces with enough broad power to compel safe practices from state to state—have maintained a general indifference. . . ." [119]

Other pressing ethical issues affecting growing numbers of individuals have to do with the transplantation of organs and the use of prostheses like artificial kidneys. When only a limited number of heart donors and machines for hemodialysis are available, by whom and by what criteria should a fortunate few be selected from a suffering multitude? Further, as control of the weather becomes possible, by what criteria will meteorologists choose between property and people?

> Suppose you have the capacity to divert a hurricane so that it either hits the shoreline and destroys billions of dollars of property and kills just a few people (because most residents can be evacuated) or it

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[118] Graubard in *Daedalus* (Spring 1969), p. vi.

[119] Walter Rugaber, "The Drug Tester's Frightening Trail," *San Francisco Chronicle*, July 30, 1969, p. 10.

> goes into the shipping lanes and destroys far less property but kills ten times as many people. How do you make that calculation?[120]

Privacy. As Pool notes, all of us have many records filed somewhere—tax records; social security records; health records; census records; military records; employment records; credit records; property records; birth, marriage, and divorce records; arrest records; school records—all subject to storage in computer memories for easy access and manipulation.

> By 2018 the researcher sitting at his console will be able to compile a cross-tabulation of consumer purchases (from store records) by people of low IQ (from school records) who have an unemployed member of the family (from social security records). Will he have the legal right? . . . Suffice it here to note that the computer management of massive files is one of the powers technology will give us in the next half century.[121]

Through remote control, it is already possible to invade privacy without trespassing. Telescopic cameras, concealed transistors, unobtrusive closed-circuit television, tapped telephone lines, two-way mirrors, helicopter patrols—many are the devices available to the outsider for seeing what was not meant for his eyes and for hearing what was not meant for his ears. The technology will continue to improve, probably, Kalven thinks, at a geometric rate.

> . . . by the year 2000 it will be possible to place a man under constant surveillance without his ever becoming aware of it. Moreover, since the culture will become cognizant of this advance, men will live with the constant possibility that they are under surveillance without ever being able to be sure whether this is so.[122]

A *Times-Post* Service newspaper story reported not long ago that deep in the basement of the Pentagon three teams of nine men each, under the command of Colonel William N. Hon, are maintaining a twenty-four-hour surveillance of 100 to 150 cities in which riots might occur. A dossier maintained on each city includes maps, data on assembly areas for troops, transportation facilities, concentrations of Negro and other low-income residents, and detention centers in addition to conventional jails. If a riot does erupt, the team on duty is quickly augmented and intensive monitoring is begun. Information on military resources in the riot area is retrieved from the computers for Pentagon decision-makers in the event federal troops are called in. "In the meantime, surrounded by teletype machines, maps, humming computers and a vast illuminated switchboard, they sit in the antiseptic light, waiting for trouble." [123]

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[120] Anthony Wiener, "The Rocky Road to Utopia," *The Futurist* (February 1969), p. 8.

[121] Ithiel de Sola Pool, "Behavioral Technology: Man Will Win More Control over His Destiny," *Toward the Year 2018*, ed. Foreign Policy Association, p. 90.

[122] Harry Kalven, Jr., "The Problems of Privacy in the Year 2000," *Daedalus* (Summer 1967), pp. 876-77.

Since the development of stratospheric airplanes, homing missiles, and satellites, nations have lost one of their traditional prerogatives: the control of information-gathering within their borders. As MacDonald observes, the satellite's potential for collecting earth-oriented data has provoked challenging legal questions about a nation's right to preserve its privacy:

> Can limits be placed by international law upon satellite data collection and how are these limits to be enforced? Can legal obligations be placed on a nation gathering data to share that information with other nations? What are the consequences of such an open sharing of basic data relating to national activities?[124]

Rationalism and emotionalism. As computer technology develops and spreads throughout the society during the next thirty years, one might expect, as does De Carlo, a concomitant spread of the "scientific" or "rationalistic" way of viewing the world and with it a concern on the part of many with the quality of life in a society operated increasingly by quantitative methods.[125]

Even now, a generalized revolt against the impersonality and dehumanization that seem to attend rationalized bureaucratic structures and mechanized quantitative programs may be well under way. Although a number of psychiatrists, psychologists, and sociologists, notable among them Kenneth Keniston of the Yale University School of Medicine, have attributed the current militancy of students largely to their desire to effect values their parents have paid lip service to, the matter may be far more complex. Harman suggests that we may be witnessing in contemporary revolutionary movements the trial of the computerized, imperialist industrial state. He believes it possible that young persons' interest in astrology, Eastern religions, and encounter groups, their use of psychedelic drugs and marijuana, their development of an underground press, and their employment of confrontation and violence may be a complex of complementary behaviors to attain similar goals—a person-centered society in which power is shared, participation is meaningful, a sense of identity and community is fostered, man and nature are synergistic, moral rather than rational persuasion is ascendant, intuition and feeling are as reversed as are cognition and rationalization

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[123] "Men Who Watch for City Riots," *San Francisco Chronicle,* July 4, 1969, p. 1.

[124] G. MacDonald, "Space," *Toward 2018,* ed. Foreign Policy Association, p. 33.

[125] De Carlo, "Computer Technology," p. 109.

Such a society, Harman contends, need not spell the end of science or technology. He maintains, in fact, that the present revolutionary undercurrent is being provided part of its rationale by the growth of a new science of subjective experience, one which is promoting investigation into hypnosis, self-actualization or fulfillment, sensory deprivation, dreams, mind-expanding drugs, parapsychology, etc. Technology, in Harman's view, could contribute to an education and growth-centered society, one in which "a person's essential worth would not be equated with his worth to the economic system."[126]

If education were to comply with students' desires for reform, deemphasizing its almost exclusive concern with cognitive processes and instead examining, and giving play to, unconscious processes and their contributions to "the highest forms of creative, imaginative, intuitive, altruistic, moral, artistic, and intellectual insight and behavior"; if it were to emphasize feelings and emotions; if it were to develop deliberately in students high self-images and self-expectations, then, according to Harman, a different curriculum would need to be planned and a different kind of staff would need to be recruited:

> If any of these changes in educational programs were to be instituted, the requirements as regards characteristics and capabilities of staff would be markedly altered. This would imply drastic changes in recruitment and training of teachers, and this in turn in the faculties and programs of teacher-training institutions. It would also require considerable changing of the expectations of parents and community as to what the schools and colleges are about.[127]

Seen in the light of Harman's argument as a struggle between a cognitive and an affective curriculum, between the impersonal, rational structure of ideas and the unpredictable and as yet unrealized creative potential of the student, the Anglo-American Conference on English discussed in chapter 1 takes on new dimensions, ones which could call not only for different curricula but for the recruitment of a different kind of teacher for the English classroom.

Michael would be sympathetic to Harman's view on the importance of developing fully the personal, humane qualities of the student, particularly if that student were capable of becoming a member of the intellectual élite that Michael believes will plan, and perforce rule, the society. However, Michael is sceptical about our willingness and ability to educate a sufficient number of people humane and compassionate enough to rule wisely in the "megalopolized, technologicized" tomorrow he anticipates:

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[126] W. Harman, "Contemporary Social Forces and Alternative Futures," p. 50.

[127] W. Harman, *Belief Systems, Scientific Findings, and Educational Policy*, pp. 9-10.

> . . . we will need many people skilled in being human: in warmth and trust, openness and compassion, in being non-manipulative and non-exploitative . . . we will need administrators, policy-makers, and executives with these characteristics, or at least with the capacity to recognize the desperate importance of these characteristics. . . . Wise men have always been scarce. They'll be relatively scarcer tomorrow because there will be more places where they will be needed. . . . As of now, we do not deliberately produce such skilled people; we don't know how. Indeed, I strongly suspect that we are not even sure that we want to. . . . If we wanted them tomorrow, we should have been training them in the numbers needed yesterday.[128]

Summary. According to the *Time*-Louis Harris Poll earlier cited, a substantial body of Americans, principally among the young, the better-educated, and the relatively affluent, have shifted or appear to be shifting values from those traditionally held. More permissive about sex, more tolerant of violence, more critical of unjust laws and hypocrisy in high places, more troubled by middle-class mores and material acquisitions, they may be the precursors of radical shifts in the ethics and morals of the majority of American citizens, despite the strong conservative tendencies found at present particularly among the old and the poorly educated. Harris' conclusion is that a huge gulf now exists between the old verities and life as Americans live it, that the poll has captured a portrait of American moral standards in a period of drastic change.[129]

If Harman is reading correctly the signs of that change, then the society may be moving toward the kind of value system discussed by Aldous Huxley in *The Perennial Philosophy* (Meridian Books, 1962), one which recognizes an immanent and transcendent Self, from which all things flow and in which all participate, knowledge of which is man's final end.

Other controversial ways of interpreting the signs of change have been provided by Teilhard de Chardin in *The Future of Man* (Harper

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[128] Michael, *The Unprepared Society*, pp. 34-35.

[129] "Changing Morality: The Two Americas," *Time*, June 6, 1969, pp. 26-27.

& Row, 1964), John Platt in *The Step to Man* (John Wiley and Sons, 1966), and Pitirim Sorokin in *The Crisis of Our Age* (E. P. Dutton, 1941). Sorokin, who presents the most ambitious account for reiterative change, believes that the predominant value system in Western society alters somewhat irregularly between "this-worldly" and "other-worldly" orientations, between the sensate (principally materialistic, rational, empirical) and the ideational (predominantly spiritual, intuitive, supersensory). In Sorokin's view, we have been living until recently in a late sensate period characterized by cynicism, disillusionment, nihilism, and atheism; we may be moving toward either an ideational period or an integral period. If the latter, then we can anticipate a highly creative age in which would be balanced rational-intuitive, scientific-religious, sensory-suprasensory, and empirical-supraempirical modes of belief and behavior.[130]

However one interprets the signs, he cannot gainsay that the values of many are undergoing dramatic alterations at present. As these alterations occur, the society runs the risk either of panicking and attempting to repress deviancy from traditional norms by police-state tactics (some of which, as Goldberg has pointed out, can be masked as "benevolent" measures), or of promoting anarchy by failing to maintain between old and new values the tension necessary for orderly change. During the next three decades, society, through cybernation and biogenetics alone, will be capable of controlling the individual—of invading his privacy, manipulating his mind, and regulating his behavior. Despite the challenge of the young, it is doubtful whether in the brief time available a new value system, capable of channeling these powers to humanistic ends, can become dominant, particularly if humanists continue their seeming obliviousness to the effects about them of technological change. It is also doubtful, as Michael has said, whether society really wants warm, trusting, compassionate leaders and whether education can produce them, even if society were supportive.

Ultimately at stake in the present conflict in values is the relationship of man to the technology he has created: will he have it free him from inhuman and tedious work, so he may become autonomous and creative in the society that Drucker, Goldberg, and Harman believe (or hope) possible, a society which fosters continuing education and self-growth? Or will he have it free him from work, only so that he may lose his sense of dignity and worth as he finds himself incapable of contributing meaningfully to a society that provides him a dole? Will he allow it to eliminate long-cherished values having to do with the right to privacy and the sanctity of the individual, willingly permitting it to be used to alter his moods, manage his thoughts, and determine his genetic inheritance? Having lost his control of both means and ends, will he see it used for the creation of ever more awesome weapons, hastening doomsday and with it a precipitant end to discussion about human life and human values? Or will he have it employed to create a global village in which every man, regarded with dignity and invested with worth, might learn truly to be his brother's keeper?

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[130] For a fuller discussion of Sorokin's views see Harman's *Belief Systems, Scientific Findings, and Educational Policy*, pp. 27-29.

The stake is crucial, and the role of formal education is paramount: as an institution, education will in large measure help shape, be shaped by, and transmit whatever values determine the future of man.

Part II

Forecasts

CHAPTER 5

LEARNING THEORY

From the sixteen written responses to Questionnaire 1, thirty-four items were structured for Questionnaire 2. Participants were invited to clarify items and to place any additional items on a supplementary page of the questionnaire; clarified and additional items were then listed on Questionnaire 3.

Of the eighteen panelists who responded to Questionnaire 2, two placed check marks rather than percentages in the five-year modules. To analyze by computer the probability in each time period of an item's being implemented, the author interpreted a check mark on this and other questionnaires to mean 50 percent probability of 20 percent implementation. (Items with a 50 percent or better chance of 20 percent implementation are those thought most important for the consideration of persons involved in or planning preservice programs of teacher education.)

Of the thirty-four items, four were regarded by participants as unclear and were rewritten for Questionnaire 3. None of the remaining thirty items reached a 50 percent probability of 20 percent implementation in time periods 1970-1974 and 1975-1979, an indication of perhaps both scholarly conservatism and confusing directions. Fourteen items attained a 50 percent or higher probability of 20 percent implementation some time between 1980 and 1999. (See table 4, in which items are listed by earliest date of implementation.)

Table 4
Learning Theory: Items with 50% Probability of 20% Implementation by 1980-1999 (*N* = *18*)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
1. Emphasis on earlier instruction of children, eventually resulting in content and concepts now taught in college or even graduate school being taught in high schools	26	37	50	54	60	63	1.93

Table 4 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
2. Regular national testing to assess quality of education	21	39	50	54	52	53	1.86
3. Increased understanding of factors influencing transfer of learning	19	31	50	59	67	71	1.50
4. Increased use of TV instruction	29	41	50	54	59	56	2.07
5. Disappearance of lockstep instruction and greater emphasis upon student-paced, continuous progress learning	21	36	46	51	56	58	1.64
6. A more scientific approach to learning and instruction through systematic analysis of the structure of content or skills, and through determination of the most effective instructional procedures for different learning tasks and different students	19	33	44	58	64	65	1.29
7. Computer assistance for teacher selecting appropriate learning materials for each child	19	33	44	54	57	59	1.86
8. Improved understanding of the relationship of basic learning to later learning	16	33	47	56	64	68	1.64
9. Clearer understanding of emotional factors affecting learning in the classroom	19	31	47	53	58	62	2.07
10. Computer-assisted instruction that allows conversational dialogues using natural language	7	16	27	44	56	59	1.71
11. Improved specification of relationship between principles of learning and goals of education	14	28	41	46	53	56	1.79
12. Computer-assisted instruction for definite and indefinite rule-bound structures, such as spelling, grammar, rhetorical strategies for composing	17	24	36	46	50	53	2.00

Table 4 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
13. Improved specification of individual differences in learning as affected by differences in teaching behavior							
	17	29	36	43	49	52	1.64
14. Better assessment of how students learn from meaningful discourse, followed by ways to train them to improve modes of communication							
	13	34	39	44	49	50	1.79

Ten items reached 40-49 percent probability of 20 percent implementation some time between 1980 and 1999. Since these items were regarded as on the borderline probability of being implemented, they as well as items from other questionnaires receiving a probability of 40-49 percent were included in questionnaire 4, which was sent only to the panel of experts on English. In table 5, items are listed from highest to lowest probability of implementation.

Table 5

Learning Theory: Items with 40-49% Probability of 20% Implementation by 1980-1999 (*N = 18*)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
15. Greater freedom of teacher to pursue the affective and value-judgment aspects of course content with students							
	22	34	44	46	48	49	2.07
16. Far less emphasis on basic reading skills in secondary schools as a consequence of improved techniques of teaching initial reading (programed reading, individually prescribed instruction, etc.)							
	11	16	35	41	46	49	2.00
17. Development of psychological mini-theories appropriate for specific areas of subject matter, e.g., a psychology of mathematics learning, a psychology of foreign language learning, etc.							
	12	19	36	45	46	46	2.21
18. Fewer courses in discrete academic disciplines and more interdisciplinary courses concerned with solving social problems							
	19	28	44	46	44	44	2.07

Table 5 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
19. Clearly established and tested behavioral objectives for commercially published instructional materials, including multi-media materials							
	8	21	31	42	45	46	1.64
20. Letter grades to be replaced by more effective utilization of intrinsic motives to learn							
	9	19	32	41	42	46	1.93
21. Individual study stations which deliver promptly whatever materials—pictures, books, tapes, filmstrips, films—the student needs							
	11	20	28	37	42	46	1.79
22. Teaching effectiveness to be determined by what a student learns, the modification of his attitudes and values, the strengthening of his educational aspirations, and his success in learning how to learn independently							
	6	19	29	34	42	46	1.57
23. Use of simulation games in most areas of instruction							
	9	19	26	35	36	41	2.29
24. Learning center in home with, e.g., computer console, television set, film and tape library							
	9	18	27	33	33	40	2.14

Six items failed to reach a 40 percent probability of 20 percent implementation by 1999 and were rejected for Questionnaire 4. In table 6, items are again listed in order from those receiving the highest to those receiving the lowest probability of implementation.

Table 6

Learning Theory: Items Failing to Reach 40% Probability of 20% Implementation by 1999 ($N = 18$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
25. Individual student selection of media he believes most appropriate to his learning style							
	6	16	26	32	36	37	2.07

Table 6 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
26. Development of a comprehensive psychological theory of instruction, made up of elements common to all mini-theories (the *general* theory) plus each of the separate mini-theories (the *special* theory) allowing for specification, via sophisticated computer programs, of types, sequences, and amounts of instructional behavior according to objectives, types of students, instructional environments, and subject matters	6	9	13	19	31	36	1.71
27. Effective breakdown of global concept of creative thinking into its component skills and identification of conditions for learning these skills	10	16	26	30	33	34	2.07
28. Teamed learning, in which higher-level student teaches lower level, who teaches still lower level, etc.	9	16	27	31	36	33	2.43
29. Drugs and other means of physical intervention as non-psychological adjuncts to instruction	1	3	5	11	19	25	2.64
30. Alteration in the nature of language as consequence of its accommodation to limitations of artificial intelligence	9	15	16	19	17	21	2.43

Questionnaire 3

Of the eight items on Questionnaire 3, four of which had been clarified from Questionnaire 2 and four of which had been submitted by participants as additional items, three reached a 50 percent probability of 20 percent implementation between 1990 and 1999. (See table 7.)

The borderline probability between 40 and 49 percent was reached by two items in time period 1995-1999. (See table 8.)

Three items failed to reach 40 percent probability of 20 percent implementation by 1999 and were not included in Questionnaire 4. (See table 9.)

Conclusions and Implications

The panel of experts on learning theory submitted thirty-eight items, seventeen of which (45 percent) received a 50 percent or higher probability of 20 percent implementation at some time after 1980.

An additional twelve items (31 percent) reached the borderline of 40-49 percent probability of implementation between 1980 and

Table 7

Learning Theory: Items with 50% Probability of 20% Implementation by 1990-1999 (*N = 18*)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
31. Testing to occur continuously during a course and to be paced with student's achievement, i.e., a student to take examination at point where he achieves increment in his repertoire relevant to that examination	**16**	**28**	**38**	**45**	**53**	**67**	**1.33**
32. Rather than occurring at ends of courses, tests to be measurements of total achievement of the student in each part of the syllabus, the purpose being to help him visualize what he has achieved and has yet to achieve	**15**	**20**	**31**	**40**	**41**	**61**	**1.80**
33. Tests to be providers to instructor of immediate feedback as to adequacy of texts and other teaching materials and their arrangements	**15**	**25**	**28**	**33**	**40**	**50**	**1.60**

Table 8

Learning Theory: Items with 40-49% Probability of 20% Implementation by 1995-1999 (*N = 12*)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
34. Teachers to be mainly managers of instructional environments rather than principally transmitters of knowledge and skills	**8**	**13**	**23**	**27**	**37**	**48**	**1.67**
35. Emphasis on teaching problem-solving rather than on teaching facts	**12**	**21**	**25**	**30**	**33**	**46**	**2.00**

Table 9

Learning Theory: Items Failing to Reach 40% Probability of 20% Implementation by 1999 ($N = 12$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
36. Disappearance of chronological boundaries between and within elementary schools, secondary schools, and colleges as a consequence of student-paced, continuous-progress learning	8	11	17	23	28	38	2.20
37. Greater emphasis in secondary English classrooms on ways of interpreting computer and other instructional displays than on interpreting ordinary reading	1	8	12	14	19	16	2.47
38. Food rewards during the day, e.g., ice cream modifying behavior in the classroom	3	8	10	9	12	13	1.93

1999. Nine items (24 percent) were rejected for failing to reach 40 percent probability of 20 percent implementation by 1999.

One needs to be chary of generalizations drawn from questionnaires about the occurrence and effects of future events; nevertheless, they are almost mandatory if the reader is not to be left with chaotic impressions produced by discrete items, percentages, and time periods. To give some form, then, to the chaos, the following generalizations about the next three decades are tentatively and hesitantly offered, with the request that the reader bear constantly in mind both that the generalizations are drawn from the insights and opinions of only one panel and that they are made in reference to 20 percent of secondary schools or their student populations, not to 100 percent. Unless negatively expressed, generalizations derive their support from items which have received 40 percent or higher probability of implementation some time between 1970 and 1999.

1. The organization and presentation of content will be more clearly in accordance with established theories of learning.

There will be a more scientific approach to learning and instruction. After a better assessment is made of how students learn from meaningful discourse, ways will be found both to diagnose teachers' discourse and to train them to improve modes of communication. Psychological mini-theories appropriate for teaching specific areas of subject matter will be developed, and behavioral objectives for commercially published instructional materials will be clearly established and tested.

Also influencing the organization and presentation of content will be an increased understanding of factors influencing transfer of learning and an improved understanding of the relationship of basic learning to later learning.

A more scientific approach to learning and instruction will utilize the improved understanding of how emotional factors affect learning in the classroom. Further, with better understanding of these factors should come greater freedom for the teacher to pursue with students the affective and value-judgment aspects of his course content.

As organization and presentation of content become accordant with a more scientific approach to learning and instruction, letter grades may decrease in importance and eventually be replaced by an effective utilization of students' intrinsic motives to learn. Finally, a more scientific approach to learning and instruction should lead to an improved specification of the relationship between principles of learning and goals of education.

2. Testing will be continuous, more accurate, and more significant.

Regular national testing will assess the quality of education. Continuous testing during a course will be paced with a student's achievement and will serve the dual purposes of helping the student visualize what he has achieved and has yet to achieve and of providing the teacher with immediate feedback about the adequacy of his teaching materials and their arrangements.

As the assessment of the student's progress in achieving the purposes of a course becomes continuous and more accurate, teaching effectiveness may be determined by changes in the student's knowledge, his attitudes and values, his educational aspirations, and his success in learning how to learn independently.

3. Lockstep instruction will wane, and the specification of individual differences and their effects upon learning will become more precise.

Lockstep instruction will disappear as greater emphasis is placed upon student-paced, continuous-progress learning. The most effective instructional procedures for different learning tasks and different students will be determined, and the computer will assist the teacher in selecting appropriate learning materials for each child. Moreover, the ways in which different teaching behaviors affect the learning of different students will be better specified.

4. Computer-assisted instruction, TV instruction, and other forms of electronically modulated instruction will not only increase but may eventually redefine the responsibilities and behavior of the teacher.

There will be an increased use of TV instruction. The computer will be used for teaching definite and indefinite rule-bound structures, such as spelling, grammar, and rhetorical strategies for composing; further, it will be programed for instruction that allows conversational dialogues using natural language. As was earlier indicated, the computer will also assist the teacher in selecting appropriate learning materials for each child. Despite the importance of the computer, however, there is little probability that the nature of language will be altered through accommodation to the limitations of artificial intelligence.

Individual study stations will be developed to deliver promptly whatever materials—pictures, books, tapes, filmstrips, films—the student needs; and the teacher could become mainly a manager of instructional environments rather than principally a transmitter of knowledge and skill.

Before the year 2000, learning centers may exist in the home.

5. Early instruction of children will affect the content of secondary programs, while the relationship between early and later learning will become better understood.

Earlier instruction of children will eventually result in content and concepts now taught in college or graduate school being taught in high school. The teaching of advanced content and concepts will be facilitated by an improved understanding of the relationship of basic learning to later learning.

6. Interdisciplinary courses concerned with solving social problems will increase, as will emphasis on teaching problem solving.

The number of courses offered in discrete academic disciplines will be reduced, and the number of interdisciplinary courses concerned with solving social problems will increase. In place of teaching facts, teachers will place greater emphasis on teaching problem solving.

7. Although there will be less emphasis on the teaching of basic reading skills, interpretation of reading in secondary English classrooms will not be less important than interpretation of other media.

Because of improved techniques of teaching initial reading, there will be far less emphasis on teaching basic reading in secondary schools. Nevertheless, teachers of English will not place greater stress on ways of interpreting computer and other instructional displays than on ways of interpreting ordinary reading.

8. There is little chance of drugs and other means of physical intervention being used as non-psychological adjuncts to instruction.

Here the panelists seem least sure of themselves, even though three of them mentioned in their reply to Questionnaire 1 the possibility of learning behavior being modified by drugs or other forms of physical intervention. Of all items on the questionnaire, item 29 (25 percent probability by 1995-1999) has the lowest mean estimate of expertise, 2.64, closer to *not well informed* than to *knowledgeable*. The standard deviation on self-estimate of expertise for this item was 1.08, indicating considerable divergence in how the experts rated their competency to respond to the item.

This particular item was submitted also by members of another panel. From this second panel it received scores comparable to those it received from the panel on learning theory. Apparently a number of highly competent educators have heard or read that drugs and/or electricity may be used in the future to alter individuals' learning, but they choose not to regard the possible as the probable. However, when one considers the present acceptance and consumption of drugs among adults in the society, the large and apparently growing "drug culture" of the young (who will be the parents, if not the grandparents, of the children of the year 2000), and the predictions of other forecasters about uses of drugs and electricity to change behavior (see, e.g., pp. 83-94), he cannot help feeling—even though he might wish them correct—that the panelists were overly cautious in their estimates of probability. A panel composed of psychologists like David Krech (see p. 91) might have provided quite different percentages.

CHAPTER 6

EDUCATIONAL TECHNOLOGY

The twelve written responses to Questionnaire 1 provided the content for a structured questionnaire of thirty-seven items. Participants were again invited to clarify items whose wording troubled them and to write any additional items on a blank page following the questionnaire. Removing ambiguity or vagueness from ten items required the writing of thirteen items for Questionnaire 3; added to these were nine new items submitted by panelists.

Of the remaining twenty-seven items on Questionnaire 2, only five received 50 percent or higher probability of 20 percent implementation before 1999 (see table 10), an indication once again perhaps of

Table 10

Educational Technology: Items with 50% Probability of 20% Implementation by 1985-1999 ($N = 18$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
1. Wall television screen for projection of both current events and lifelike reenactments of major scientific and cultural events							
	10	22	40	50	49	48	1.89
2. Use of computers for compiling students' records and for providing reports of continuous progress							
	23	43	49	53	54	52	1.83
3. Improved printed materials—paperbacks, short books with specific purposes, tutorial books, books that send students to other experiences and resources and back to books again							
	32	38	47	53	51	49	2.00
4. Possession by those who teach teachers of a better blend of knowledge and of the skills to help people learn							
	18	27	38	45	51	53	1.83
5. Utilization, by teachers of teachers, of methods and materials typical of those ultimately to be used in schools							
	14	26	31	48	52	54	1.83

scholarly conservatism and/or vague directions (the problem of the percentage of a percentage is discussed in chapter 2) leading the panelists to be more cautious in estimating probability than one might expect.

Although only five items received 50 percent or higher probability, twelve items were found to be on the borderline probability of implementation (40-49 percent) and were included in Questionnaire 4. These items are listed in table 11 in order of the highest to the lowest probability of being implemented.

Table 11

Educational Technology: Items with 40-49% Probability of 20% Implementation by 1980-1999 (*N = 18*)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
6. Differentiation of teaching staff, e.g., teacher aides, technicians, beginning and experienced teachers	19	29	39	49	47	46	2.06
7. Simple, economical sound-film projectors	23	34	43	48	44	41	2.22
8. Greater emphasis upon multi-media, multi-sensory learning than upon print	16	23	36	40	45	47	1.78
9. Commercially produced [multi-media kits] supplemented by teacher-guided local productions	21	27	32	39	41	47	1.89
10. Major involvement of students in planning instruction, establishing instructional goals, and selecting methods; and assumption of greater responsibility for their own learning	16	31	41	39	44	46	1.89
11. Learning centers in schools permitting individualized AV presentations	18	26	34	37	43	45	2.00
12. Libraries of moderately priced films, tested, and instantly available to teachers and students	11	21	28	36	42	44	1.72

Table 11 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
13. Cassette-type tape recorders and extensive libraries of cassette package programs							
	18	34	41	43	42	41	2.17
14. Availability to public of canned and tested instruction (in form of film or tape) on almost any subject							
	11	21	32	39	42	43	2.00
15. Changes in the performance of secondary teachers because of earlier exposure in higher education to effective and varied methods of instruction							
	11	20	27	34	38	43	1.94
16. Tested multi-media kits systematically developed to teach for specific objectives							
	23	27	36	39	40	42	1.94
17. Use of learning carrels with built-in audio, visual, or audiovisual resources; and with facility for response to or communication with a computer (CAI)							
	11	17	26	32	39	40	1.78

Ten items were rejected for Questionnaire 4 for having failed to reach a 40 percent probability of 20 percent implementation by 1999. Items in table 12 are again listed in order from those receiving the highest to those receiving the lowest probability of implementation.

Table 12

Educational Technology: Items Failing to Reach 40% Probability of 20% Implementation by 1999 (*N* = *18*)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
18. Portable, personal AV equipment for students (e.g., TV receivers, video recorders, phonographs), owned by students, leased to them, or supplied							
	7	15	21	29	34	37	2.22

Table 12 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
19. Gaming and simulation as methods of instruction	14	18	29	31	34	35	1.94
20. More time of students in peer-group activities than in teacher-student activities	7	16	24	33	33	34	2.28
21. Video recorders available to each classroom for recording and playback	10	23	26	32	33	34	1.94
22. Computing facilities for large housing complexes, eliminating need for separate school buildings by conveying knowledge directly to people	1	5	9	17	25	31	1.89
23. Artificial satellite or planet communication	2	9	22	27	29	29	2.39
24. Laser-beam conduction of data from highly remote locations	0	3	13	21	27	26	2.67
25. Taxpayer revolts, leading to fewer books, fewer support personnel, fewer funds for technological aids to learning	20	20	14	12	9	8	2.00
26. Technological devices for teaching composition by direct imitation	7	11	13	15	18	18	2.83
27. Use of medically approved drugs to enhance learning	1	4	7	12	12	13	2.83

Questionnaire 3

Of the thirteen clarified and nine new items in Questionnaire 3, five received a 50 percent probability of 20 percent implementation between 1975 and 1999. (See table 13.)

Time module 1995-1999 presented a peculiar problem. Two items (clarified items 32 and 33) reached 50 percent probability of 20 percent implementation in the period, but a third item (clarified item 31) on which 32 seemed to be dependent reached only 49 percent probability. Correlations between items 31 and 32 varied in time periods from a high of .63 (1975-1979) to a low of .50 (1990-1994). Because of the ambiguity of the referent for *these*, some panelists may have chosen to interpret item 32 as "Concerted national effort to attain goals of education" rather than as "Concerted national effort to attain goals of education which have been clearly defined and understood." For the sake of clarity, item 31 is therefore included in table 13.

Table 13
Educational Technology: Items with 50% Probability of 20% Implementation by 1975-1999 ($N = 17$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
28. Acceptance, support, and justification of audiovisual media (e.g., projectors, films, slides, tapes—not TV and computer systems) because of their demonstrated effectiveness in improving both learning and utilization of teaching talent	38	56	63	72	75	76	1.77
29. Changes in classroom organization and school architecture to allow flexibility in instruction	17	35	51	57	61	64	1.69
30. Teachers to be mainly managers of instructional environments rather than principally transmitters of knowledge and skills	19	31	46	56	66	64	1.85
31. Clearly defined and understood goals of education	11	21	29	36	44	49*	1.69
32. Concerted national effort to attain these goals	12	22	32	41	48	54	2.00
33. Computers accessible to secondary students through telephone lines in home	8	21	38	44	48	51	1.38

* See paragraph above.

Including clarified item 31, nine items reached borderline probability of implementation (40-49 percent) between 1985 and 1999. Items are listed in table 14 from highest to lowest probability.

Eight items were not included in Questionnaire 4 for having failed to reach 40 percent probability of 20 percent implementation by 1999. In table 15 items are again listed from highest to lowest probability.

Table 14

Educational Technology: Items with 40-49% Probability of 20% Implementation by 1995-1999 ($N = 17$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
34. Production of multi-media, multi-mode data banks, modulated by a computer, for retrieval by students on demand (Computer-Mediated Instruction, not Computer-Assisted Instruction)	9	15	22	36	45	49	1.62
31.* Clearly defined and understood goals of education	11	21	29	36	44	49	1.69
35. Videotape, "light pencil," and audio-response systems under computer control, allowing flexible input and output	10	14	24	35	41	49	1.62
36. Cathode ray tube for CAI	11	16	26	36	43	48	1.46
37. Technicians to manage instructional environments, whereas teachers to specialize in transmission of knowledge	12	24	32	41	46	47	1.69
38. Use of TV as an information retrieval system as well as a school broadcast system	11	20	26	34	40	44	1.85
39. Quantification of systems modeling techniques applied to secondary education	8	15	23	29	36	44	1.77
40. Teleprinter for CAI	8	16	24	35	38	43	1.46
41. CAI conversationally interactive language which is machine-independent and universally available for execution of instructional programs on many computers (*many* = 5 or more; *universally* = U.S., Canada, 1 Asian, 1 African, 1 Far Eastern, and 5 European nations)	5	11	15	27	36	41	1.62

* See p. 121.

Table 15

Educational Technology: Items Failing to Reach 40% Probability of 20% Implementation by 1999 ($N = 17$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
42. Broadcast media to provide on-the-job professional training of teachers	**12**	**19**	**33**	**36**	**37**	**39**	**2.00**
43. Understanding of and application of closed-loop, cybernetic systems using feedback to control secondary school programs	**6**	**13**	**19**	**27**	**32**	**35**	**1.92**
44. Decentralization of schools into community-run training and instructional centers for the arts, computing sciences, social agency work, etc.	**5**	**6**	**18**	**26**	**31**	**34**	**2.15**
45. Visual and audio holography for recreating events and teaching concepts	**6**	**8**	**15**	**23**	**31**	**33**	**1.46**
46. Financial and academic accountability of teachers for the success of their methods	**6**	**12**	**20**	**25**	**32**	**32**	**2.15**
47. Group CAI: 3-4 students interact with each other *and* a computer in a conversational mode	**6**	**9**	**13**	**21**	**28**	**32**	**1.31**
48. Expenditures of funds comparable to those expended in space sciences for experimentation and evaluation of various instructional methodologies	**6**	**9**	**16**	**23**	**26**	**32**	**1.62**
49. Broadcast media to provide advanced professional training of teachers	**11**	**16**	**23**	**27**	**30**	**31**	**1.92**

Conclusions and Implications

The panel of experts on educational technology submitted forty-nine items, ten of which (20 percent) received a 50 percent or higher probability of 20 percent implementation at some time after 1975.

An additional twenty-one items (43 percent) reached the borderline of 40-49 percent probability of 20 percent implementation some time after 1980.

Eighteen items (37 percent) which did not reach 40 percent probability before 1999 were excluded from Questionnaire 4.

Though one must be careful not to be overly confident about any inferences, patterns, and generalizations he makes from information provided by the panel on educational technology (particularly in view of the fact that only one-fifth of the items received 50 percent probability of being implemented, i.e., of affecting the educational programs of 20 percent of the secondary schools or the education of 20 percent of the student populations), not to give some form to the raw data is to be overly pusillanimous and to do the reader a disservice. Again the reader is asked to remember that probability refers to 20 percent and not 100 percent implementation; that inferences are drawn from data submitted by only one, not all, of the panels; and that the generalizations and their support, unless negatively predicated, derive from items receiving 40 percent or higher probability of implementation before 1999. No matter how assertive they appear, the generalizations are perforce tentative.

1. Changes in the performance of secondary teachers may result from the improved instruction they have received.

In the future, teachers of teachers not only will possess a better blend of knowledge and of the skills to help people learn but will utilize methods and materials typical of those ultimately to be used in the schools. Because of secondary teachers' earlier exposure in higher education to effective and varied methods of instruction, their performance in the classroom may change.

2. Demonstrated effectiveness of audiovisual media will lead to their wide acceptance, support, and justification.

Because of their demonstrated effectiveness in improving both learning and utilization of teaching talent, audiovisual media (e.g., projectors, films, slides, tapes—not TV and computer systems) will be widely accepted, supported, and justified.

3. Instructional resources and materials will be better designed and far more varied than they are at present.

Students will have available to them improved printed materials of many types—paperbacks, short books with specific purposes, tutorial books, books that will send them to other experiences and resources and back to books again. Classrooms will have wall television screens on which can be projected both current events and lifelike reenactments of major scientific and cultural events. Cassette-type tape recorders and extensive libraries of moderately priced and tested films will be instantly available to teachers and students.

Schools will be able to purchase both tested multi-media kits that have been developed to teach for specific objectives and kits that can be supplemented by teacher-guided local productions. Simple, economical sound-film projectors will be available in schools, as will be learning centers that permit individualized AV presentations. Toward the end of the century, canned and tested instruction (in form of film or tape) on almost any subject may become available to the public.

Eventually television will be used as an information retrieval system as well as a school broadcast system; and by the last half-decade of the century, students may have available to them learning carrels both with built-in audio, visual, or audiovisual resources and with facilities for response to or communication with a computer.

4. Computers will be accessible to both students and teachers for a variety of purposes.

Through the computer, students will be able to retrieve data on demand from multi-media, multi-mode data banks; further, they will have access to computers through telephones lines in their homes. To lighten the teacher's load, the computer will compile students' records and provide continuous reports of students' progress.

Equipment for computer-assisted instruction will include cathode ray tubes and teleprinters. The computer will control videotape, "light pencil," and audio-response systems which allow for flexible input and output. A conversationally interactive language, machine-independent and available for execution of instructional programs on many computers, may eventually facilitate the use of computer-assisted instruction.

5. Multi-media, multi-sensory learning will receive greater emphasis than does print.

Because of the easy availability of cassette-type recorders and cassette package programs, economical sound film projectors and moderately priced films, video and other nonprint media, greater emphasis will be given to multi-media, multi-sensory learning than to print.

6. Flexibility of instruction will necessitate changes in school architecture and classroom organization, differential staffing, and new roles for teachers.

To allow for flexibility of instruction, changes will be made in both school architecture and classroom organization. Flexible instruction will further require differentiating the responsibilities of the instructional staff, though how these responsibilities will be distributed is not clear at present. Either teachers will continue to specialize in transmitting knowledge and delegate to technicians the responsibility of managing instructional environments, or they themselves will become mainly the managers of these environments. Presented with these options, the panel gave the latter choice the higher probability of implementation.

7. Techniques of systems analysis will not greatly influence the structure and performance of secondary education.

By 1995-1999 there is only 35 percent probability that secondary school programs will be controlled by feedback from closed-loop, cybernetic systems and only 40 percent probability that quantification of systems modeling techniques will be applied to secondary education.

8. Teachers and schools will not be replaced by sophisticated media.

The need for separate school buildings will not be eliminated by computing facilities that convey knowledge directly to people in large housing complexes, nor will broadcast media provide either on-the-job or advanced professional training of teachers. One may infer that teachers will continue to return to school to refurbish old and acquire new knowledge.

9. Students will become actively involved in planning instructional programs and will assume greater responsibility for their own learning.

In decades ahead students will assume greater responsibility for their own learning by becoming actively involved in planning instruction, establishing instructional goals, and selecting methods. They will not, however, spend more time in peer-group activities than in teacher-student activities.

10. Citizens will continue to support the schools financially and ideologically, though funding will not be as generous as educators might desire.

Panelists believe that there will be a concerted national effort to attain goals of education that have been clearly defined and understood, but they strongly reject the notion that there will be widespread taxpayer revolts leading to fewer books, fewer support personnel, and fewer funds for technological aids to learning.

Despite their confidence in continued financial support for schools, panelists do not think that funds comparable to those expended in space sciences will be available for experimenting with and evaluating various instructional methodologies. Apparently they even doubt that video recorders will be available to 20 percent of the classrooms by the end of the century or that portable, personal AV equipment will be available to 20 percent of the students.

CHAPTER 7

SECONDARY CURRICULUM

The twelve responses to Questionnaire 1 provided content for thirty-nine items on Questionnaire 2. At the request of panelists, five of these items were clarified for Questionnaire 3, leaving Questionnaire 2 with a total of thirty-four items, twenty-two of which reached 50 percent probability between 1975 and 1999. (See table 16.)

Table 16

Secondary Curriculum: Items with 50% Probability of 20% Implementation by 1975-1999 (*N = 18*)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
1. Student activism and demands for greater freedom, independence, and involvement in planning their education and in establishing policies relating to their conduct while under jurisdiction of the school	42	56	55	49	48	48	2.00
2. Better integration and mingling in schools of students representing the cross-section of racial groups and socioeconomic levels found in urban areas	21	45	56	65	64	69	2.12
3. Modular scheduling for flexible curricular patterns, e.g., team teaching, individualized instruction, large-group and small-group instruction	26	42	51	54	56	61	1.82
4. More complete cooperation of school and community agencies with regard to disadvantaged youth	24	42	51	60	61	64	2.18
5. Increased participation of major industrial organizations (especially electronics industries) in production, maintenance, and use of instructional materials	31	47	56	61	60	65	2.18

Table 16 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
6. Increasing incorporation into the secondary-school curriculum of content from social sciences, e.g., anthropology, psychology, sociology, ecology	**26**	**44**	**58**	**62**	**61**	**66**	**1.88**
7. Development of programs engaging students, sometimes for extended periods, in various enterprises outside of school, e.g., occupational and vocational training, service projects, cultural activities, political and governmental projects	**15**	**36**	**45**	**51**	**55**	**60**	**1.71**
8. Development of skills laboratories for instruction, largely individualized, in skills like computation, location of information, spelling, punctuation, etc.	**20**	**36**	**46**	**52**	**55**	**57**	**2.00**
9. Differentiation of staff by professional training and experience, e.g., experienced teachers, beginning or intern teachers, teacher assistants and aides, technicians	**28**	**41**	**49**	**54**	**59**	**62**	**1.82**
10. Greater emphasis on teaching skills of inquiry, problem solving, and management of information than upon teaching facts	**26**	**38**	**48**	**51**	**52**	**55**	**1.88**
11. Preparation of enticing and educationally sound materials for students of low ability	**24**	**39**	**49**	**56**	**60**	**59**	**2.06**
12. Increasing incorporation into the secondary-school curriculum of advanced material in sciences and mathematics	**22**	**37**	**46**	**51**	**55**	**56**	**2.24**
13. Greater stress upon human relations—on ways of adjusting conflicts, relations of minority groups to each other and to the majority, literature reflecting great human problems, social studies focusing on enhancement of individual, etc.	**30**	**44**	**48**	**55**	**54**	**56**	**2.00**
14. Development of multi-leveled ungraded programs in each skill and content area, K-12	**14**	**30**	**44**	**46**	**51**	**55**	**1.77**

Table 16 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
15. Development of a single, strong teachers' union	14	31	49	48	51	49	2.41
16. Games and simulations as means of instruction	21	35	46	48	55	54	2.00
17. Instructional use of broadcast and closed-circuit television	26	38	48	49	54	54	1.94
18. Differentiation of staff by responsibility and specialty, e.g., directors of learning activities responsible for educational programs of groups of students, teachers with various specialties assigned by directors, counselors responsible for planning and assessing the psychological and academic development of students assigned to them	22	33	42	48	48	59	1.76
19. Development of behavioral objectives for each subject and of techniques to evaluate according to those objectives	21	35	41	44	47	50	1.59
20. Greater emphasis upon multi-media, multi-sensory learning than upon print	19	29	41	48	48	52	1.82
21. Preservice and inservice education more explicitly related to academic disciplines, with both concepts and modes of inquiry derived from these disciplines	16	28	42	48	47	51	2.06
22. A close relationship between practice in the classroom and theory derived from classroom research	9	24	35	45	47	51	1.82

Only three items were found to be in the borderline probability of implementation (40-49 percent). In table 17 these items are listed from highest to lowest probability.

Nine items were rejected for Questionnaire 4 for having failed to attain 40 percent probability of 20 percent implementation some time between 1970 and 1999. In table 18, items are again listed from highest to lowest according to the probability of their being implemented.

Table 17

Secondary Curriculum: Items with 40-49% Probability of 20% Implementation by 1980-1999 ($N = 18$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
23. Development of pre-technical curriculum at secondary level	19	31	39	47	46	49	2.41
24. Increased attention to the mental health of the teacher in his selection for employment, his retention, and his upgrading	11	21	32	42	41	46	2.47
25. The use of computer-mediated (as distinct from computer-assisted) instruction	8	21	32	37	42	45	2.32

Table 18

Secondary Curriculum: Items Failing to Reach 40% Probability of 20% Implementation by 1999 ($N = 18$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
26. Preparation of teachers to do classroom studies ("action" research) related to teaching problems in their subjects	9	16	27	34	38	39	1.88
27. Outstanding secondary teachers to have equivalent of Ph.D. in subject matter field and/or fields of learning theory and child growth and development	8	15	26	31	38	38	2.12
28. Development of a departmentalized middle school (perhaps grades 4 through 8) with staff and facilities much stronger than present elementary and junior high school	14	27	38	39	35	37	2.47
29. Development of schools within schools (units of approximately 500 students) in metropolitan areas	14	22	28	32	37	36	2.18
30. Increased lay participation in curriculum planning	20	29	35	36	35	34	1.94

Table 18 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
31. Development of multi-branched programed materials with interchangeable parts from program to program	12	19	29	32	35	35	2.12
32. As consequence of increasing importance of quantitative methodology, an extension of mathematics requirements to 3 or 4 years for at least abler students	15	21	28	32	34	35	2.24
33. Establishment of large educational complexes in cities, i.e., learning centers providing educational programs for persons from 2 or 3 to 70 or 75	7	15	28	27	28	30	2.00
34. Increased attention at all levels to communication skills in programs of English or language arts and decreasing attention to objectives related to literary appreciation	22	26	28	30	28	26	2.18

Questionnaire 3

Revision of the five items in Questionnaire 2 that participants found vague or ambiguous resulted in six clarified items for Questionnaire 3. In addition, the questionnaire contained two new items which panelists had submitted, a total of only eight items. Of these eight, six received 50 percent probability of 20 percent implementation between 1975 and 1999. (See table 19.)

One problem with new item 40, as one panelist pointed out, is that it is too global, too imprecise. If it specified that teachers of a particular subject with present loads of *x* number of students will have their loads reduced by one-fifth, the item would be much sounder. But, unfortunately, that kind of specificity for each item, desirable as it is to a researcher, can make a questionnaire unwieldy for participants, with the result that it goes unanswered. Too, the item was presented to the panel as it had been submitted: extensive revision, which could have rendered the item specific, might have been at the expense of what the participant had intended. One walks a delicate line in structuring questionnaires.

One item reached borderline probability of implementation (40-

Table 19

Secondary Curriculum: Items with 50% Probability of 20% Implementation by 1975-1999 ($N = 13$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
35. Development of courses emphasizing health (physical and mental), marriage, child rearing, family life, and related topics	33	50	61	60	60	59	2.00
36. Development of intradisciplinary courses, e.g., various arrangements of anthropology, sociology, psychology, economics, and other social sciences; or various arrangements of biology, chemistry, physics, and other sciences	22	40	55	60	52	53	1.75
37. Development of interdisciplinary courses, e.g., various arrangements of art, music, literature, history; or various arrangements of biology, psychology, anthropology, chemistry	19	33	52	55	49	48	1.67
38. Individualized instruction by means of independent study, small-group activity, and non-computerized programed learning materials	31	45	55	52	58	59	1.67
39. Individualized instruction by means of computer-assisted instruction	15	29	44	47	55	57	1.83
40. Reduction in teacher loads by one-fifth	13	27	41	41	52	46	1.50

Table 20

Secondary Curriculum: Item with 40-49% Probability of 20% Implementation by 1990-1999 ($N = 13$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
41. Decentralization of school systems, with local (community) control of schools	20	33	39	38	42	42	1.67

Table 21

Secondary Curriculum: Item Failing to Reach 40% Probability of 20% Implementation by 1999 ($N = 13$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
42. Disappearance of "grade" or "year" boundaries within and between elementary school, high school, and college as a consequence of student-paced, continuous-progress learning	10	17	25	27	35	35	1.58

49 percent) and was included in Questionnaire 4, while another was rejected for having failed to reach 40 percent probability by 1999. (See tables 20 and 21).

Conclusions and Implications

The panel on secondary curriculum submitted forty-two items, twenty-eight of which (67 percent) received a 50 percent or higher probability of 20 percent implementation at some time after 1975.

Four items (10 percent) reached borderline probability of implementation some time after 1985.

Ten items (23 percent) were rejected for Questionnaire 4 for not having arrived at 40 percent probability of 20 percent implementation by 1999.

Compared to either the panel on learning theory or the panel on educational technology, the panel on secondary curriculum appears considerably less conservative in its assessment of probability of implementation for the items it submitted. As the reader may recall, the panel on educational technology believed that only 20 percent of its items had a 50 percent or higher probability of implementation; the panel on learning theory awarded 40 percent of its items an even or better than even chance of being implemented; but the panel on secondary curriculum gave two-thirds of the items it submitted (67 percent) at least 50 percent probability of implementation by 1999. On items either identical or very similar to those which appeared in the questionnaires of the other two panels, e.g., "Greater emphasis upon multi-media, multi-sensory learning than upon print," or "Gaming and simulation as methods of instruction," the panel on secondary curriculum was up to 20 percentage points more optimistic that the items would be implemented.

A number of reasons might account for panels voting discrepantly on either the same or a quite similar item. First, a panelist's self-estimation of expertise is based upon his comparing his knowledge to the knowledge of others in his field. On a given item, a person on the panel for educational technology might have considered himself knowledgeable in comparison with other persons in the field of educational technology; but in comparison with experts in learning theory, he might not have been truly well informed. Therefore, he could have been either more liberal in the probability of implementation he assigned the item or more conservative than is warranted. Second, since implementation refers to the probability of an item's affecting either the education of at least 20 percent of the student population or 20 percent of the educational programs of the secondary schools, those panelists most intimately familiar with the operation of secondary schools and the behavior of adolescents might have been able to make more realistic assessments of probability than could persons lacking this familiarity. Third, slight variation from one panel to the next in the wording of an item might have strongly affected participants' responses. However, since the study did not have as one of its purposes the correlation of different panels' responses to the same item and since variation in the wording of an item was a consequence of the author's desire to do as little editing as possible of the item as it had been submitted, no sustained attempt was made to keep items constant.

In regard to items not similar or identical to those submitted to other panels, the panel on secondary curriculum may have been more discriminatory in what they had submitted as "major developments in their field that would affect the responsibilities and behavior of secondary teachers" and, hence, more deservedly optimistic about the implementation of those items. On the other hand, persons who specialize in secondary curriculum may innately be more sanguine than experts in other fields. The labyrinths through which a researcher may wander in search of a cause are not only intricate but endless.

Despite the high probability of implementation given to numerous items, the reader is urged once again to remember as he reads the following generalizations that they are applicable only to 20, not to 100, percent of secondary school programs or their student population; that they are tentative, as all statements about the future are compelled to be; that both they and their support, unless non-affirmatively stated, are drawn from items receiving 40 percent or higher probability of implementation.

1. The curriculum will provide for both fluidity in its structure and the mobility of students.

Modular scheduling will allow for flexible curricular patterns of various kinds, and multi-leveled ungraded programs will be developed in each skill and content area from kindergarten through high school. "Grade" or "year" boundaries within and between elementary school, high school, and college will not disappear, however, because of student-paced, continuous-progress learning. Some programs will encourage students to become engaged, occasionally for extended periods, in such enterprises outside of school as occupational and vocational training; service, political, and governmental projects; and cultural activities.

2. The curriculum will include new content as well as new arrangements of old content.

A pre-technical curriculum may be developed at the secondary level. Incorporated into the curriculum in general will be advanced materials in sciences and mathematics; content from the social sciences not frequently taught now in secondary schools, e.g., anthropology, psychology, sociology, and ecology; and courses emphasizing physical and mental health, marriage, child rearing, family life, and related topics.

Students will have available both intradisciplinary and interdisciplinary courses from which to choose. Examples of intradisciplinary courses might be various arrangements of anthropology, sociology, psychology, economics, and other social sciences; or various arrangements of biology, chemistry, physics, and other sciences. Serving as interdisciplinary courses could be various arrangements of biology, psychology, anthropology, and chemistry; or various arrangements of art, music, literature, and history.

3. There will be increased emphasis upon both individualized instruction and problem-solving approaches to learning.

Modular scheduling will facilitate individualized instruction, of which there will be a variety of forms; among them independent study, small-group activities, non-computerized materials for programed learning, and computer-assisted instruction. To increase their proficiency in computing, locating information, spelling, punctuating, etc., students will go to skills laboratories for instruction which will be largely individualized. Too, there will exist enticing and educationally sound materials for students of low ability.

Less emphasis will be placed upon students' learning facts than upon their learning skills of inquiry and methods both of solving problems and of managing information. A common means of teaching at least some of these skills and methods will be games and simulations.

4. Students, who will be better integrated, will demand to become actively involved in planning their education and in establishing policies regulating their own conduct.

Students representing the cross-section of racial groups and social/economic levels found in urban areas will be better integrated into schools and better mingled within classes. Students will demand, and be ready to demonstrate for, greater freedom, independence, and involvement in planning their education and in establishing policies relating to their conduct while under the school's jurisdiction.

5. Instructional uses of television, computer, and other media may lead to less emphasis being placed upon print than upon multi-media, multi-sensory learning.

There will be an increase in the instructional use of broadcast and closed-circuit television; as the century wanes, both computer-mediated and computer-assisted instruction may be available to students. The availability for instructional use of television and computer, as well as tapes, records, and film, may result in less emphasis being placed upon print than upon multi-media, multi-sensory learning.

Regardless of facilities for machine-aided learning, programs of English or language arts will not give decreased attention to objectives related to literary appreciation in favor of increased attention to objectives related to language skills.

6. Despite increased participation by industry in the production, maintenance, and use of instructional materials, curricular stress upon human relations will be greater than it is at present.

The increased participation of major industrial organizations, especially electronics industries, in the production, maintenance, and use of instructional materials need not depersonalize or dehumanize the curriculum. In fact, greater stress upon human relations is expected in the curriculum—on ways of adjusting conflicts, on relations of minority groups to each other and to the majority, on literature that reflects great human problems, on material in social studies that focuses on the enhancement of the individual, etc.

7. Teachers will probably not be prepared to be researchers themselves, but their performance in the classroom will be closely related to theory derived from classroom research.

Just below borderline by the end of the century is the probability that teachers will be prepared to do classroom studies ("action" research) related to teaching problems in their subjects. Nevertheless, practice in the classroom will be closely related in the future to theory derived from classroom rather than from laboratory research. One consequence of classroom research may be the development of behavioral objectives for each subject and of techniques to evaluate performance according to those objectives.

8. Although schools may come under community control, curriculum planning will remain the responsibility principally of educators.

There is borderline probability by 1990-1994 that school systems will be decentralized, with local communities assuming control of the schools. Well before that time, more complete cooperation of school and community agencies will be established to assist disadvantaged youth. However, lay participation in curriculum planning will not increase substantially before the year 2000.

9. Teachers will be differentially staffed and perhaps more mentally healthy; they also may be strongly unionized.

Differential staffing will occur, though its structure is uncertain. A simple hierarchical pattern may be predominant, with professional training and experience determining the lines of authority, e.g., experienced teachers, beginning or intern teachers, teacher assistants and aides, technicians. Or a more complex and fluid pattern may emerge dominant, with a director of learning activities being made responsible for assigning groups of students in accordance with their educational needs to members of the staff who possess special competencies. In this pattern, counselors would be responsible for planning and assessing the psychological and academic development of students assigned them. In either pattern, academic disciplines will not be disregarded: panelists anticipate that both preservice and inservice education will become in decades ahead more explicitly related to academic disciplines, with both concepts and modes of inquiry being derived from these disciplines.

On the borderline probability of implementation is increased attention being given to the mental health of the teacher in his selection for employment, his retention, and his upgrading. However, the panel's mean estimate of expertise for this item (24) is 2.47, about midway between *knowledgeable* and *not well informed*. If teachers do become more mentally healthy, improvement may be credited at least partially to their having had their loads reduced by one-fifth.

By 1990-1994, or perhaps even earlier, the battle for teachers' professional loyalties may be over, the National Education Association (NEA) and its affiliates having merged with the American Federation of Teachers (AFT) to form a single, strong teachers' union. But again, panelists do not provide for this item (15) a mean estimate of expertise which could help one feel confident of their judgment: 2.41.

CHAPTER 8

ENGLISH

My own research has convinced me that red-inking errors in students' papers does no good and causes a great many students to hate and fear writing more than anything else they do in school. I gave a long series of tests covering 580 of the most common and persistent errors in usage, diction, and punctuation and 1,000 spelling errors to students in grades 9-12 in many schools, and the average rate of improvement in ability to detect these errors turned out to be 2 per cent per year. The dropout rate is more than enough to account for this much improvement if the teachers had not even been there. When I consider how many hours of my life I have wasted in trying to root out these errors by a method that clearly did not work, I want to kick myself. Any rat that persisted in pressing the wrong lever 10,000 times would be regarded as stupid. I must have gone on pressing it at least 20,000 times without any visible effect.

Although nobody knows what the right lever will turn out to be, my own hunch is that we may have to program out most of these errors through the ear before we can affect the eye or the hand.

—From the letter of a panelist,
February 13, 1969

The panel on English was both articulate and profuse with its comments. A number of the sixteen responses to Questionnaire 1 were from three to six pages in length, single-spaced. More than any group, this panel raised questions about the wording of items, worried over implications and nuances of meaning, reported concern about the potential uses of such "hardware" as computers in the classroom. Like members of other panels, the participants expressed reservations about the method being used to forecast the responsibilities of secondary teachers of English and about their own ability to foresee events:

> In doing any forecasting of future responsibilities of secondary English teachers, one is likely to confuse what one would like to come to pass and what is really to happen.

> How in hell am I supposed to get all the things I think will

> happen in English-teacher education in the next thirty years into a list that makes sense? If, for example, I listed "technology" as a major advancement, I'd like to qualify exactly what I mean since the field ranges from 8mm concept films to computer assisted instruction. Some of the things under that rubric will die out; others will, in my opinion, prevail.
>
> I find myself facing two difficulties. . . . In the first place, it may not be "major developments in English" which will have the greatest impact upon the behavior and responsibilities of English teachers, but rather developments in education and in our environment generally. I have in mind such possibilities as the increase in industrial automation, which will bring in its wake a vast increase in the amount of leisure time available to the individual as well as the necessity for many trained technicians; the increased use of systems design in analyzing and attempting to solve school problems; the possibility of increased participation of students and parents in decisions relative to all aspects of education; a totally different concept of the school calendar and of school buildings than that which is still prevalent.

The deficiency of listing items in questionnaires is that it omits the support given the citations, the asides, the bons mots, the whole tone and the texture of a panelist's response to a question inviting him to speculate about the future of secondary English. To illustrate more fully what is missing, the following quotations are presented, all of them from the letter of one panelist. From his discussion of reduction in the number of class meetings per week:

> Each teacher may be responsible for a large-group presentation about once a month; some who are not very effective in this role may have none at all. The small groups may be thought of as half-classes discussing mainly the required books and student papers. . . . These small groups will *not* be expected to discuss what was presented to the large group (as in the old section meetings in college). The more advanced a school is, the sharper is the distinction between what is presented to large groups and what is discussed in small groups.

From his discussion of independent reading as a scheduled elective:

> The new offering in English that is closest to my heart, most important, and most likely to come about is something like two periods a week for independent reading, regularly scheduled as an elective on the same basis as electives in art, music, shop, typing, and the like. . . .
>
> The reading of self-chosen books on one's own initiative, apart from school requirements, apparently reaches a peak in Grade 8 and declines thereafter with each increment in age and education until the great majority of American adults read hardly any books. This seems to be true in spite of the paperback revolution. . . . I am still investigating the causes of this decline, but I have little doubt that the increased homework in Grade 9 and above is at least a contributing

> factor. Although many students do not get all their homework done, it is always there to do, and they put it aside to read a book of their own choice only with a guilty conscience. Hence there is need for some time in the weekly schedule in which there is nothing to do but read whatever one likes—with help of various kinds to find books that one is likely to enjoy. . . .
>
> Such provision for independent reading must not be expected to increase the number of books read on one's own above the level attained in Grade 8. Beyond puberty most students find more interesting ways to spend their free time. But for all but the lowest quarter in reading skill (in disadvantaged areas, the lower half), it can maintain some interest in reading books through age 17. I regard the maintenance of this interest as the central intellectual obligation of educated men and as the most important objective of secondary education. If it requires some sacrifice of French or math or science, that is just too bad, but the habit of reading books on one's own must have priority.

From his discussion of the restriction of the systematic study of grammar to grades 7-8-9:

> I regard the systematic study of any kind of grammar, traditional or modern, in English classes as a waste of time that we shall not be able to afford when the number of class meetings per week is reduced. My reason is that students persistently refuse to learn it even though it is taught over and over again. . . . I should like to turn over the whole responsibility for teaching grammar to the foreign languages, where it makes sense to students, and where most students learn it if they ever learn it at all. Failing that, I should like to make it a six-week or a twelve-week unit open as an elective to only the top quarter of students in verbal ability. I fear, however, that it will be impossible to cure most English teachers of the habit of teaching grammar in the near future. It might be possible to confine this evil to Grades 7-8-9 and to reduce the time devoted to it through the development of self-instructional programs—that would have to be a great deal better than the two Blumenthal programs. Casual references to grammar in higher grades would not be forbidden whenever they were needed to clarify some point of usage or interpretation, but it should be understood that the time for any systematic study of grammar had passed.

One could go on quoting from this letter, less than one-fourth of which has been presented, or from other letters. But the point has been established: excising items from letters, placing the items in questionnaires, quantifying probability of implementation are necessary procedures if one is to get expediently some sense of concurrence among panelists, some notion of what may and may not be truly important, some indication of emerging trends in secondary education. But the excising, the structuring, the quantifying bury beneath numbers and pale prose the human beings who have contributed to the study, prohibiting exposure of their imaginations, their passions, their logic, their wit, their styles. Numbers may be less messy to work with than are persons, less spontaneous, less given to polemics and ambivalences, neater in appearance, at times even truer to reality. They may be significant, ominous, important, or even overwhelming; but if they are, it is because human beings interpret them as such. In short, they are not vital.

Questionnaire 2

The sixteen responses to Questionnaire 1 provided fifty-eight items for Questionnaire 2. Ten of these items were clarified for Questionnaire 3, leaving a still healthy total of forty-eight items.

The sixteen panelists who completed Questionnaire 2 gave eighteen items a 50 percent or higher probability of implementation between 1975 and 1999. (See table 22).

Table 22

English: Items with 50% Probability of 20% Implementation between 1975 and 1999 ($N = 16$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
1. Greater concern with nonstandard dialects of English	43	51	55	48	43	40	1.40
2. Course in black literature and culture	43	53	48	40	34	33	1.80
3. Emphasis upon rhetoric, particularly psychological matters (analyzing audience, establishing voice, etc.) and thought processes underlying writing and speaking	35	38	51	49	50	45	1.53
4. Attention to aspects of language or linguistics not widely taught now—nature and history of language, dialects, semantics, phonology, morphology, etymology, lexicology, etc.	30	43	51	48	41	41	1.67
5. Better understanding and acceptance by teachers of language children speak	31	43	53	60	61	63	1.47

Table 22 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
6. Use of audio-lingual equipment, e.g., tape recorders, to improve both speech and writing	35	42	53	58	63	65	1.73
7. Courses relating literature to other fine arts (or humanities courses)	31	41	48	52	50	50	1.53
8. Flexible scheduling of classes, e.g., modular scheduling	29	40	48	53	53	53	2.00
9. Changes in the nature of libraries, with reliance upon film storage and the development of reading by television or microfiche readers	25	33	43	51	63	69	2.13
10. Silent and sound motion pictures taught as a literary medium	28	39	46	47	50	49	1.80
11. Differentiation of teaching staff, e.g., teacher aides and assistants, technicians, beginning and experienced teachers	27	33	40	46	51	52	1.73
12. Ungraded programs in English, either elective or dependent upon student's knowledge and skills	19	32	43	47	53	55	1.47
13. Learning centers in schools permitting various kinds of individualized instruction	23	33	43	49	53	59	1.87
14. Greater emphasis upon multi-media, multi-sensory learning than upon print	25	33	39	47	53	61	1.67
15. Automated systems of information retrieval (e.g., ERIC)	16	26	40	45	57	59	2.13
16. Development of more imaginative homework assignments by publishers (e.g., ones providing basic assignments for all students, optional problems for groups to explore, and independent-study projects for individuals)	29	37	47	49	53	54	1.47

Table 22 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
17. Decrease in the split between affective and cognitive learning							
	22	30	39	45	50	51	1.60
18. Availability to each classroom of closed-circuit and broadcast TV							
	15	22	35	41	53	53	2.00

Borderline probability of implementation was reached by fourteen items, all of which were included in Questionnaire 4. In table 23 items are listed from highest to lowest probability of being implemented.

Rejected for Questionnaire 4 for having failed to attain 40 percent probability of 20 percent implementation before 1999 were sixteen items. In table 24 items are again presented in order of highest probability to lowest probability of being implemented.

Table 23

English: Items with 40-49% Probability of 20% Implementation between 1975 and 1999 (*N = 16*)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
19. A better selection of required books in grades 7-8-9 to ease the transition from juvenile to adult reading interests							
	35	47	49	49	47	47	1.40
20. Team teaching, involving small-group and large-group instruction							
	29	38	47	45	49	49	1.80
21. Development of behavioral objectives for English and of techniques to evaluate according to those objectives							
	23	32	41	45	47	47	1.40
22. Television taught as a literary medium							
	18	27	37	42	46	47	1.87

Table 23 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
23. Videotape recorders available to each classroom for recording and playback, leading to teachers and students becoming more analytical and critical of instructional processes	21	31	42	46	46	42	1.87
24. New approaches to grammar, beyond generative-transfor[illegible]onal grammar	21	26	33	37	45	45	2.00
25. Combination of large-group, small-group, and individualized instruction, leading to a reduction in the number of class meetings per week	19	27	37	41	43	43	1.80
26. Tendency of dialect differences to disappear	15	18	23	33	39	43	1.67
27. Development of holistic curricula (N = 14) vs. K-6, J.H.S., S.H.S.	12	15	23	31	37	43	1.87
28. A move away from an emphasis on "new" criticism to a more affective theory of literature	31	37	41	42	40	41	1.93
29. Independent reading as a scheduled elective, perhaps 2 hours weekly	17	28	36	37	41	41	1.60
30. Breakdown of global concept of creative thinking into its component skills and identification of conditions for improving learning of these skills	19	27	33	33	39	41	1.80
31. A closer relationship between theory founded upon educational research and practice in the English classroom	17	25	35	39	39	40	1.47
32. Elimination of English as mandatory subject in the junior and senior year of high school	8	9	15	21	36	40	1.73

Table 24

English: Items Failing to Reach 40% Probability of 20% Implementation by 1999 ($N = 16$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
33. Emergence of English as humanistic center of the high-school curriculum, where issues are explored via experiences with literature, language, composition, other media	20	29	33	36	36	35	1.80
34. Use of technology, including computerized linear and branching programs, for problem solving, affective learning, involvement in humanistic concerns	13	17	25	32	36	36	1.87
35. Greater financial and academic accountability of teachers for the success of their methods	17	21	26	36	33	31	1.93
36. Less use of standardized tests to determine students' "abilities"	22	27	35	29	27	27	1.67
37. Eclectic arrangements of the literature curriculum, based upon a variety of short patterns of instruction rather than upon extensive arrangements by chronology, genre, theme, archetype	19	23	29	32	29	33	1.53
38. Programs based on short-term elective courses	17	21	33	29	30	31	1.33
39. Programmatic demands on the teacher leading to a lessened emphasis upon literature	17	21	25	26	29	31	1.60
40. Exchange programs in English with teachers and students from other countries	14	18	27	28	29	30	2.27
41. Differentiation of English staff by "content" specialties, e.g., specialist in composition, specialist in poetry	17	22	24	29	29	28	1.80
42. Grammar taught in relation to composition and literature	14	21	25	29	27	27	1.60

Table 24 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
43. Emergence of transformational-generative grammar as THE grammar	17	25	26	23	13	11	1.93
44. Restriction of the systematic study of grammar to grades 7-8-9	19	21	22	19	19	19	1.53
45. The determination of concepts peculiar to English which will become its discipline (e.g., tragedy, satire, paradox, imagery, etc.)	13	17	21	21	18	18	1.60
46. Differentiation of English staff by both "content" and "process" specialties, e.g., specialist in grammar, specialist in discussion	15	20	18	17	18	17	1.80
47. Postponement of all (or nearly all) plays by Shakespeare to grade 12	9	10	10	11	11	14	1.60
48. Residential schools for students	3	5	9	10	12	15	2.73

Questionnaire 3

Questionnaire 3 contained ten clarified items and twenty-three new items that had been submitted by panelists. Of these twenty-three items, six arrived at 50 percent or higher probability between 1985 and 1999. (See table 25.)

Table 25

English: Items with 50% Probability of 20% Implementation between 1985 and 1999 (*N = 12*)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
49. Careful attention to processes of composing in the teaching of composition	23	38	46	51	53	53	1.75
50. Special course offerings in college or university departments of English for prospective secondary teachers of English with different professional goals	24	37	44	46	53	53	1.58

Table 25 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
51. Attention to English literature produced in countries other than England and America							
	19	30	43	49	53	53	1.75
52. Multiple-book programs in place of anthology-centered courses							
	27	33	43	47	52	58	1.67
53. As a consequence of militancy of teachers and impact of unionism, inservice and continuing education, as well as curriculum development, to be planned within school day and school year							
	16	28	42	48	53	55	2.17
54. Opportunities for individual students to develop skills through reading and writing clinics							
	25	36	44	48	49	50	1.75

Borderline probability was reached some time after 1980 by sixteen items. In table 26, items are listed highest to lowest probability of implementation.

Eleven items were rejected from Questionnaire 4 for having failed to receive at least 40 percent probability of 20 percent implementation by 1999. In table 27 items are again listed from highest to lowest probability.

Table 26

English: Items with 40-49% Probability of 20% Implementation by 1980-1999 (*N = 12*)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
55. Installation and operation of educational facilities, both within and outside schools as presently known, by private corporation (e.g., IBM, RCA, Xerox Corp.)							
	14	20	35	42	48	47	2.08
56. Programed texts and computerized programs allowing individualized learning of "basic skills" (e.g., in spelling, punctuation, grammar)							
	18	29	38	45	48	46	1.67

Table 26 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
57. Close attention by teachers to the development of reading interests and habits of pupils	30	38	43	42	46	48	1.67
58. Emphasis on teaching methods of problem solving rather than upon teaching facts	15	23	34	39	44	48	1.50
59. Student participation in classroom dramatic activities: acting out plays, role playing, improvising drama	18	30	42	45	47	47	1.67
60. As reaction from alienating and dehumanizing technological developments, a turning toward the human dimensions of the literary work of art as resource for individual human beings	25	33	38	41	46	46	1.58
61. Development of curriculums by school systems and private industry with federal financial support	21	29	38	38	45	46	2.00
62. More participation in teacher education by school districts and a decline of the influence of schools of education	20	32	38	42	44	46	1.58
63. Modification of present tenure and credential systems as consequence of differentiated staffing and other organizational redevelopments	19	24	37	39	43	45	1.67
64. Emphasis on English as an instrument for clarifying, through its uses, personal and social experiences in daily life	26	31	40	40	44	44	1.83
65. Movement from "content-oriented" to "process-oriented" programs in secondary English	20	32	43	43	43	43	1.75
66. Emphasis on literature as a mode of experience to be reflected on, rather than as a subject matter for analysis	24	33	39	40	43	43	1.67

Table 26 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
67. Genuine understanding by teachers of problems of pupils in various aspects of language learning	18	23	33	38	40	42	1.67
68. Tutorial instruction, especially of more capable students	23	30	37	38	40	40	1.83
69. Development of reliable methods of teaching varieties of standard English to speakers of deviant dialects	21	27	33	37	39	40	1.75
70. An integration in the curriculum of "mass" or "popular" literature (e.g., lyrics of rock music, *Mad* magazine, best sellers, TV programs) with traditional literature	18	27	34	35	38	40	1.67

Table 27

English: Items Failing to Reach 40% Probability of 20% Implementation by 1999 ($N = 12$)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
71. Emotional, imaginative, and intellectual "involvement" (of the type foreshadowed by the Anglo-American Conference at Dartmouth) of the student in what he reads or writes	17	28	37	38	39	38	1.50
72. Integrated relationship between basal programs and dial access systems providing for individual study, recorded lecture, dramatization, etc.	11	16	24	30	37	39	2.33
73. Less influence on preparation of English teachers by college and university departments of English and more interdepartment preparation: speech, drama, psycholinguistics, world literatures	13	23	30	35	36	38	1.75
74. Laboratory and demonstration schools to deal with educational problems of ghetto schools	22	33	38	35	33	33	2.17

Table 27 (cont.)

Item	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	Mean Estimate of Expertise
75. Greater prestige given the secondary English teacher who is a "research" specialist than is given the secondary English teacher who is not	11	20	28	33	35	36	1.50
76. Increased development of small private schools for more personal, quality education for those who can pay	19	26	30	38	32	32	2.33
77. Use of extra-school personnel for theme evaluation	23	28	32	31	31	30	1.75
78. Reversal of trend toward specialization and fragmentation of field of "English" and development of "English" teacher as a kind of guidance person working with individual through the latter's use of and response to language, oral and printed	17	22	27	28	25	23	1.83
79. Development of voice typewriters, with consequent syntactic and stylistic changes in written composition	8	12	20	18	23	25	2.17
80. National centralization and control of information, i.e., films, television, radio, newspapers, and magazines	8	11	13	18	19	22	2.00
81. Decline at university levels in the status of the humanities in an increasing technological culture, and stress on humanities as a cultural veneer for college prep students at secondary level	15	19	18	18	15	15	1.83

Conclusions and Implications

The panel of experts in English submitted eighty-one items, twenty-four of which (30 percent) received a 50 percent or higher probability of 20 percent implementation at some time after 1975, and thirty of which (37 percent) reached the borderline of 40-49 percent probability of implementation between 1975 and 1999.

The number of items submitted was far greater than that submitted for other panels (Questionnaires 2 and 3 for English contained forty-two items more than did Questionnaires 2 and 3 for Secondary

Curriculum, thirty-eight items more than did Questionnaires 2 and 3 for Learning Theory, forty-nine items more than did Questionnaires 2 and 3 for Educational Technology). One could ascribe the richness of the responses to the fact that many of the participants personally knew the author of the study, or one might attribute it to the infinite variety and richness of the subject matter of English. Or an outsider might even be so unkind as to suggest that English teachers are talkative by nature. No matter the cause: the author is grateful for the contributions and for the time, thought, and talent that went into their making.

Once again the reader is asked to remember the preceding conditions so that he does not give the generalizations that follow more than their due: first, the generalizations pertain to effects upon 20 percent, not 100 percent, of the educational programs or student population of the secondary schools; second, they are drawn from the forecasts of one panel, not all panels; third, they derive their support, unless they contain a negation, from items receiving 40 percent or higher probability of being implemented. Since no item on any questionnaire received 100 or even 80 percent probability of implementation, all generalizations are highly conditional.

1. The curriculum in English will be more flexible, its objectives and means of evaluation more clearly defined, its emphasis more upon process than upon content.

Flexibility in the curriculum will result from the development of ungraded programs in English; the elimination of English as a mandatory subject in grades 11 and 12; team teaching which involves both small-group and large-group instruction; the existence of independent reading as a scheduled elective; the development by publishers of more imaginative homework assignments; and the flexible scheduling of classes. As one panelist wrote, "Programmatically, the five-day, one-hour-per-day 'class' is dead."

Behavioral objectives for English and techniques to evaluate according to those objectives will be developed. Teachers and students will become more analytical and critical of instructional processes as a consequence of their recording and playing back via videotape recorder activities in the classroom.

Increasingly during the next thirty years, teachers will place emphasis on students' learning methods of problem solving rather than on their learning facts. The movement in secondary English will be from "content-oriented" to "process-oriented" programs. By the end of the century, one will find a closer relationship than that found at present between theory based upon educational research and practice in the English classroom.

2. Students will have numerous opportunities for individualized instruction.

Students will be able to individualize their learning of "basic skills" (e.g., in spelling, punctuation, grammar) through programed texts and computerized programs; they will be able to develop skills in reading and writing at clinics designed for this purpose; they will attend learning centers which permit various kinds of individualized instruction; and they will receive tutorial instruction, particularly if they are more capable students.

3. Private industry will play an important part in developing new educational facilities and programs.

Private corporations (e.g., IBM, RCA, Xerox Corporation) will install and operate educational facilities, both within and outside schools as presently known. Too, with federal financial support, private industry will cooperate with school systems in developing curriculums. Toward the end of the century, one may find holistic curriculums (K-13 rather than K-6, 7-9, 10-12, 13-14) being developed for school systems, perhaps through this collaboration of industry and education.

4. School districts will assume greater responsibility for the professional preparation of teachers, while differential staffing may require modifications in present tenure and credential systems and in collegiate or university requirements for secondary teachers of English.

The influence of schools of education will decline as school districts assume more responsibility for teacher education. However, as a consequence of the militancy of teachers and the impact of unionism, school districts will have to plan within the school day and the school year programs of inservice and continuing education as well as the development of curriculum.

As differential staffing becomes more common, college or university departments of English may have special course offerings for prospective secondary teachers of English with different professional goals. (Since panelists gave only 29 percent probability to differentiation of English staff by "content" specialties such as poetry and composition and only 20 percent probability to differentiation by both "content" and "process" [e.g., discussion] specialties, the special kinds of course offerings cannot be stipulated. Rather than special courses for a differentiated staff, the panel may have had in mind special course offerings for prospective junior high school teachers or prospective teachers of the disadvantaged, for example.) Too, differential staffing and other organizational redevelopments may lead to the modification of present tenure and credential programs.

5. The present split between affective and cognitive modes of learning will diminish.

English will be stressed as an instrument for clarifying, through its uses, personal and social experiences in daily life. One can anticipate a continuing move away from emphasis on "new" criticism to emphasis upon a more affective theory of literature. Rather than as a subject matter for analysis, literature will be viewed as a mode of experience to be reflected on. As a reaction from alienating and dehumanizing technological developments, there will be a turning toward the human dimensions of the literary work of art as a resource for individual human beings.

Although the panelists foresee only 39 percent probability of emotional, imaginative, and intellectual "involvement" (of the type foreshadowed by the Anglo-American Conference at Dartmouth) of the student in what he reads or writes, they nevertheless believe that English will be stressed as an instrument for clarifying social and personal experiences and that students will participate in classroom dramatic activities: acting out plays, role playing, improvising drama. By the end of the century, the global concept of creative thinking may have been broken down into its component skills, with the conditions for the learning of these skills identified.

6. Greater variety will be found in both the content and the organization of literature programs.

Humanities courses in which literature is related to other fine arts will increase. To ease the transition from juvenile to adult reading interests, there will be a better selection of required books in grades 7-8-9. Independent reading as a scheduled elective, perhaps two hours weekly, will be available to students. Greater attention than at present will be given to English literature produced in countries other than England and America. Courses in black literature and culture will grow during the next decade, and then slowly decrease for the next twenty years. By the end of the century, an integration in the curriculum of traditional literature with "mass" or "popular" literature (e.g., lyrics of rock music, *Mad* magazine, best sellers, TV programs) may have been effected.

7. Language study will be broadened in the curriculum and students' uses of language better appreciated by teachers.

Teachers will show a better understanding and a more ready acceptance of the language children speak; further, they will possess a genuine understanding of the problems students have in learning various aspects of language.

Greater attention will be given in the curriculum to aspects of language or linguistics not widely taught now—the nature and history of language, dialects, semantics, phonology, morphology, etymology, lexicology, etc. New approaches to grammar, beyond generative-transformational grammar, are anticipated. Considerable concern with nonstandard dialects of English may lead to the development of reliable methods of teaching varieties of standard English to speakers of other dialects. These methods, in combination with the influence of standard speech heard on media and the pressures toward conformity in the society, will result in a tendency for dialect differences to disappear.

8. More attention will be paid to processes underlying written and oral composition.

Processes of composing will receive careful attention in the teaching of composition. Particular emphasis will be given to psychological matter (analyzing audience, establishing voice, etc.) and thought processes underlying writing and speaking. Students will use audio-lingual equipment, such as tape recorders, to improve both their speech and writing.

9. Multi-media, multi-sensory learning will receive greater emphasis than does print.

Silent and sound motion pictures as well as productions on television will be taught as literary media. Closed-circuit and broadcast TV, tape recorders, and videotape recorders will be available to each classroom for instructional use. Learning centers will make accessible to students a variety of media for large-group, small-group, or individual instruction. The ready availability and frequent use of these audio and nonprint visual media will result in their receiving greater emphasis for learning than does print.

10. Increases in knowledge will necessitate new methods of information retrieval.

Film storage and the development of reading by television or microfiche readers will change the nature of libraries as repositories of printed and bound volumes. Automated systems of information retrieval, such as ERIC, will increase, bringing rapidly to their subscribers information either expensively printed or inexpensively filmed.

CHAPTER 9

TEACHER EDUCATION

General Implications for Programs of Teacher Education

The study might well have ended with data accumulated from the three questionnaires. Certainly, as has been done, one can draw inferences from these data about future professional responsibilities of secondary teachers as envisioned by the panelists. Moreover, he can infer some general changes needed in preservice programs of teacher education if prospective secondary teachers are to be prepared to assume these new responsibilities during the next thirty years.

In one form or another, numerous items are repeated from one panel to the next as major developments of the future: differentiated staffing; multi-media, multi-sensory learning; classroom availability of both closed-circuit and broadcast television; individualized learning through independent study, tutorials, programed and/or computer-assisted instruction; more pedagogical emphasis upon problem solving than upon facts; clearer instructional objectives and better means of evaluating those objectives; nongraded and elective programs; broadened content in the curriculum, possibly with inter- and intradisciplinary arrangements; increased involvement of students in planning curriculum, with their concomitant acceptance of more responsibility for their own educations; greater curricular stress on human relationships.

Each of these items has implications for programs of teacher education, particularly if those responsible for the programs believe that implementation of the items will be educationally sound for students and worthwhile to a democratic and humane society. If a teacher is to make the wisest use of instructional television, for example, then he must become familiar with its potential in his subject field, and he must have supervised experience in planning and carrying out lessons utilizing the medium in a secondary classroom. If he is to emphasize problem solving rather than facts, then he must be taught how to organize his subject to this end, and he must have experience in planning and carrying out lessons within his discipline that involve students in solving problems. If he is to individualize instruction, then he must learn a great deal about how individuals differ, how these differences can be assessed, what instructional resources are available for students with different abilities and interests and aspirations, what responsibilities the student has in determining the content and structure of his own education, what curricular organization is necessary if individualized instruction is to be successful. If eventually he is to become a member of a team with varied instructional responsibilities, then at the very least he should be alerted to this possibility during his preservice education, made aware of innovative programs now employing differential staffing in secondary schools, provided opportunities whenever possible to observe some such programs in action, and furnished some experience in cooperative lesson planning and instruction, even if only with and among his fellow fledgling teachers.

One could continue drawing implications. However, the purpose of the study was neither to forecast responsibilities of secondary teachers in general, nor to suggest specific procedures by which programs of teacher education could help prospective teachers anticipate and contribute to changes in their professional responsibilities during the next three decades. The purpose was rather to forecast the responsibilities of secondary teachers of English from 1970 to 1999 and to suggest the implications of the forecast for programs now preparing secondary teachers of English. Upon examining the data, those responsible for these programs, which vary considerably, must decide for themselves what modifications to make in their present programs as well as how to make them.

While the participants in the panel on English, through their responses to Questionnaires 1, 2, and 3, furnish a forecast of major developments that they anticipate will affect the behavior and responsibilities of secondary teachers of English, the forecast as it stands in chapter 8 is limited: it fails to show which of these developments as well as which of the developments anticipated by participants on panels other than English may have the most pronounced influence on the responsibilities and behavior of a secondary teacher of English. Persons in charge of a teacher's preservice education can disregard a development whose implementation will have little bearing on the teacher's professional responsibilities. On the other hand, they must make relevant to the prospective teacher the importance of developments whose implementation may strongly affect his professional responsibilities at some time during his career.

Specific Implications for Programs of Teacher Education in English

Questionnaire 4, Part I. To provide some notion of which developments should most concern those responsible for the teacher's preservice education, participants on the panel on English were asked in the directions for Questionnaire 4 to write after each item having a 40 percent or higher probability of implementation the number *1* if they believed implementation of the item would have considerable bearing on the responsibilities and behavior of secondary teachers of English; number *2* if they believed implementation of the item would have some bearing; number *3* if they believed the item's implementation would have virtually no bearing. Items worded similarly on Questionnaires 2 and 3 were consolidated into single items to reduce the length of the questionnaire; nevertheless, 130 items remained. To make slightly more distinct the variance among items, all numbers listed by participants were multiplied by 2, after which sums were divided by the number of responses. The *N* varied slightly because of participants occasionally choosing not to respond to an item about which they felt insufficiently knowledgeable.

Of the 130 items, 12 (9 percent) received mean scores of 2.00 to 2.99, tending toward *considerable* bearing; 82 items (63 percent) received mean scores between 3.00 and 3.99, *more than*, but tending toward, *some* bearing; 35 items (27 percent) received mean scores between 4.00 and 4.99, *less than*, but tending toward, *some* bearing; only 1 item (1 percent) received a score between 5.00 and 5.99, tending toward *virtually no* bearing. Because of the considerable number of items, only those receiving a mean score ($\bar{X}$) of 2.00 to 3.50 will be presented.

As one examines table 28, he should remember the tentative condition, *if implemented*, established in the directions for each item. The participants on the panel for English responded according to directions, though a number made clear their disbelief that some of the listed developments would be implemented at any future time.

A number of items in table 28 should immediately concern those responsible for the preservice education of secondary teachers of English; others appear to be outside the purview of programs of teacher education; still others must await development before they can become matters of concern.

To illustrate these differences, one can cite item 8 as one which should be of immediate concern: "Student participation in classroom dramatic activities; acting out plays, role playing, improvising drama"; item 5 as one which appears to be outside the purview of programs of teacher education: "Concerted national effort to attain [clearly defined and understood] goals [of education]"; and item 9 as one which must await development before it can be incorporated into a preservice program for secondary teachers of English: "Development of reliable methods of teaching varieties of standard English to speakers of deviant dialects."

Table 28

English: Items Which, If Implemented, Will Have from *Considerable* to *More Than Some* Bearing on the Responsibilities of Secondary Teachers of English

($\bar{X} = 2.59 - 3.50$)

Item	$\bar{X}$	N
1. Letter grades to be replaced by more effective utilization of intrinsic motives to learn	2.59	17
2. Disappearance of lockstep instruction and greater emphasis upon student-paced, continuous-progress learning	2.59	17
3. Individualized instruction by means of independent study, small-group activity, and non-computerized programed learning materials	2.59	17
4. A more scientific approach to learning and instruction through systematic analysis of the structure of content or skills, and through determination of the most effective instructional procedures for different learning tasks and different students	2.82	17
5. Concerted national effort to attain [clearly defined and understood] goals [of education]	2.94	17
6. Better assessment of how students learn from meaningful discourse, followed by ways to diagnose teachers' discourse and ways to train them to improve modes of communication	2.94	17
7. Development of multi-leveled ungraded programs in each skill and content area, K-12	2.94	17
8. Student participation in classroom dramatic activities: acting out plays, role playing, improvising drama	2.94	17
9. Development of reliable methods of teaching varieties of standard English to speakers of deviant dialects	2.94	17

Table 28 (cont.)

Item	$\overline{X}$	N
10. Improved printed materials—paperbacks, short books with specific purposes, tutorial books, books that send students to other experiences and resources and back to books again	2.94	17
11. Movement from "content-oriented" to "process-oriented" programs in secondary English	2.94	17
12. Possession by those who teach teachers of a better blend of knowledge and of the skills to help people learn	2.94	17
13. Preparation of enticing and educationally sound materials for students of low ability	3.00	16
14. Clearly defined and understood goals of education	3.06	17
15. Emphasis on teaching methods of problem solving rather than upon teaching facts	3.06	17
16. Combination of large-group, small-group, and individualized instruction, leading to a reduction in the number of class meetings per week	3.06	17
17. Better understanding and acceptance by teachers of language children speak	3.06	17
18. Genuine understanding by teachers of problems of pupils in various aspects of language learning	3.06	17
19. As consequence of militancy of teachers and impact of unionism, inservice and continuing education, as well as curriculum development, to be planned within school day and school year	3.06	17
20. Videotape recorders available to each classroom for recording and playback, leading to teachers and students becoming more analytical and critical of instructional processes	3.18	17
21. Careful attention to processes of composing in the teaching of composition	3.18	17
22. Multiple-book programs in place of anthology-centered courses	3.18	17
23. Development of behavioral objectives for English and of techniques to evaluate according to those objectives	3.18	17
24. Clearer understanding of emotional factors affecting learning in the classroom	3.25	16

Table 28 (cont.)

Item	$\overline{X}$	N
25. Team teaching, involving small-group and large-group instruction	3.29	17
26. Improved specification of individual differences in learning as affected by differences in teaching behavior	3.29	17
27. Greater freedom of teacher to pursue with students the affective and value-judgment aspects of course content	3.29	17
28. Acceptance, support, and justification of audiovisual media (e.g., projectors, films, slides, tapes—not TV and computer systems) because of their demonstrated effectiveness in improving both learning and utilization of teaching talent	3.29	17
29. Emphasis on English as an instrument for clarifying, through its uses, personal and social experiences in daily life	3.29	17
30. Emphasis on literature as a mode of experience to be reflected on, rather than as a subject matter for analysis	3.29	17
31. Greater stress upon human relations—on ways of adjusting conflicts, relations of minority groups to each other and to the majority, literature reflecting great human problems, social studies focusing on enhancement of individual, etc.	3.29	17
32. Teaching effectiveness to be determined by what a student learns, the modification of his attitudes and values, the strengthening of his educational aspirations, and his success in learning how to learn independently	3.38	16
33. Greater emphasis upon multi-media, multi-sensory learning than upon print	3.38	16
34. Opportunities for individual students to develop skills through reading and writing clinics	3.38	16
35. Improved specification of relationship between principles of learning and goals of education	3.41	17
36. Learning centers in schools permitting various kinds of individualized instruction	3.41	17
37. Development of skills laboratories for instruction, largely individualized, in skills like computation, location of information, spelling, punctuation, etc.	3.41	17

Table 28 (cont.)

Item	$\overline{X}$	N
38. Teachers to be mainly managers of instructional environments rather than principally transmitters of knowledge and skills	3.41	17
39. Courses relating literature to other fine arts (or humanities courses)	3.41	17
40. Close attention by teachers to the development of reading interests and habits of pupils	3.41	17
41. Use of audio-lingual equipment, e.g., tape recorders, to improve both speech and writing	3.41	17
42. A better selection of required books in grades 7-8-9 to ease the transition from juvenile to adult reading interests	3.41	17
43. Better integration and mingling in schools of students representing the cross section of racial groups and socioeconomic levels found in urban areas	3.41	17
44. Greater concern with nonstandard dialects of English	3.50	16

One reading through the list of items which the panel on English believed would have the greatest bearing on the responsibilities and behavior of secondary teachers of English cannot fail to be impressed with the number of items relating to patterns for individualizing instruction and for making the curriculum more flexible. Too, he cannot help feeling that emphases on literature as a mode of experience to be reflected upon, on English as an instrument for clarifying personal and social experiences in daily life, on human relationships, on dramatic activities, and on the individual learner are all reminiscent of curricular emphases given to English in the 1930's and 1940's by such leaders in NCTE as Dora V. Smith, Wilbur Hatfield, Louise Rosenblatt, Lou LaBrant, and Helene Hartley.

Whether an "experience curriculum" in English for the secondary schools is better received in the 1980's and 1990's than it was in the 1930's and 1940's will probably depend more on the education provided teachers in departments of English than on that provided in departments of education. Earlier attempts to establish emphases on "process," problem solving, and experience were repudiated by college and university professors of English who regarded such emphases as "un-academic" and un- (if not *anti-*) intellectual. The content curriculum" of the 1960's, with its emphasis upon English as a discrete body of content divisible into language, literature, and composition, resulted in large part from this repudiation. (See, for example, *Issues, Problems, and Approaches in the Teaching of English*, ed. George Winchester Stone, Jr. [Holt, Rinehart and Winston, 1961]; and *Freedom and Discipline in English* [College Entrance Examination Board, 1961].)

Questionnaire 4, Part II. Because a considerable number of items submitted by panelists for Questionnaires 2 and 3 were anticipated rather than inchoate developments, a question was needed that would evoke from the panelists the specific changes they believed both possible and desirable right now in programs of teacher education. Such a question was placed at the end of Questionnaire 3: "In the light of your present intuitions about secondary education [for the panel on English, "secondary English education"] during the next three decades, what major changes, if any, would you now recommend for the preservice education of secondary teachers?"

From the responses, fifty items—some culled from articles written by panelists and sent as replies to the question—were structured for Questionnaire 4, Part II. Each item was rewritten so that it would have relevance to the preservice preparation of secondary teachers of English. Panelists for English were asked to write *1* if they believed the item to be a *necessary* component of this preparation; *2* if they believed the item to be a *desirable but not necessary* component; *3* if they believed the item to be *neither necessary nor desirable.* Once more to make the variance among items slightly more pronounced, numbers listed by participants were multiplied by 2, after which sums were divided by the number of responses. *N* again varied slightly because of participants occasionally choosing not to respond to an item about which they felt inadequately informed.

Of the fifty items, sixteen (32 percent) received mean scores of 2.00 and 2.99, tending toward *necessary;* eighteen items (36 percent) received mean scores between 3.00 and 3.99, *more than,* but tending toward, *desirable;* twelve items (24 percent) had mean scores between 4.00 and 4.99, *less than,* but tending toward, *desirable;* four items (8 percent) had mean scores between 5.00 and 5.99, tending toward *neither necessary nor desirable.*

In consideration of the length as well as the number of items, once again only those with a mean score of 2.00 to 3.50 will be presented.

Table 29

English: Items Ranging from *Necessary* to *Highly Desirable* in the Preservice Education of Secondary Teachers of English

(X = 2.00-2.99)

Item	$\overline{X}$	N
45. A prospective secondary teacher of English should learn how to use in his subject field discovery approaches to learning	2.12	17
46. The prospective secondary teacher of English needs to learn how to reveal clearly to students the social relevance of his subject field: knowledge should not be presented for knowledge's sake	2.35	17
47. A prospective secondary teacher of English needs to learn to be a creator and manager of learning strategies and systems: to know how to determine and evaluate outcomes, and how to select appropriate instructional practices to achieve these outcomes (how, in short, to develop curriculums)	2.47	17
48. A prospective secondary teacher of English should be familiar with the processes of language development of children	2.47	17
49. A prospective secondary teacher of English should be required to take course work in such ancillary fields as anthropology, sociology, and psychology	2.59	17
50. Programs to prepare secondary teachers of English for the disadvantaged should intensively involve the teacher-education staff with successful classroom teachers, principals, counselors, and others in planning, supervising, and evaluating the experiences of the prospective teachers	2.59	17
51. In programs to prepare secondary teachers of English for the disadvantaged, college courses should be modified so that techniques and skills essential to teaching in depressed areas can be developed: diagnostic and remedial procedures, methods and materials for individualized instruction, strategies for classroom control, use of personnel and material resources	2.59	17
52. A prospective secondary teacher of English needs to learn to be outcome-oriented instead of procedure-oriented, to learn to evaluate his success by how much he has changed students and not by the content of his lectures or his uses of technology in the classroom	2.71	17

Table 29 (cont.)

Item	$\overline{X}$	N
53. A prospective secondary teacher of English should be familiar with and practiced in the uses of creative dramatics in the classroom	2.71	17
54. A prospective secondary teacher of English not only should be able to pass a competency examination in advanced composition but should be familiar with research and processes in the teaching of composition	2.71	17
55. A prospective secondary teacher of English should be familiar with differences in geographical and social dialects and should learn to find acceptable some forms of nonstandard English	2.75	17
56. A prospective secondary teacher of English should become familiar with important research in such areas as perception, diagnosis of learning capabilities, concept formation, taxonomics of learning, learning "styles," operant reinforcement, and individualized learning	2.82	17
57. Programs to prepare secondary teachers of English for the disadvantaged should intensely involve behavioral and social scientists—cultural anthropologists, social psychologists, city planners, political scientists—who apply research and theory from their disciplines to the specific needs and problems of the disadvantaged area	2.82	17
58. At least two substantive courses in English should be developed in the college or university to serve prospective secondary teachers of English as models of how instruction in English should take place	2.88	17
59. A prospective secondary teacher of English needs to learn how to evaluate commercially- and self-developed instructional materials against behaviorally defined objectives	2.94	17
60. A prospective secondary teacher of English for the disadvantaged should have during his college years early and continuous relationships with children and adults in disadvantaged areas in a variety of school and non-school related activities, e.g., tutoring, observing classes, supervising after-school activities	2.94	17
61. The pedagogical competencies of a prospective secondary teacher of English should be evaluated according to performance criteria rather than by G.P.A., courses, and credits	3.18	17

Table 29 (cont.)

Item	$\overline{X}$	N
62. Professors both of education and of English should participate in regular seminars in which students discuss what they are learning on campus and in schools	3.18	17
63. Since a secondary teacher of English must be able to *teach* a subject as well as know it, key courses in his major should be different from those designed for researchers or for those who will enter other professions	3.29	17
64. A prospective secondary teacher of English should be able to pass competency examinations in oral interpretation of literature and/or spoken rhetoric	3.38	16
65. A prospective secondary teacher of English should have at least 100 hours of experience working with children of varied cultures outside the school environment	3.50	16

No person examining the twenty-one items in table 29 would find anything close to all of the components that are necessary or highly desirable in the preservice education of secondary teachers of English. But he would be able to infer some of the major concerns that twenty eminent panelists have about preservice education, concerns that suggest some directions and emphases for those responsible for preparing secondary teachers of English for the nation's junior and senior high schools. Five major concerns appear to be these:

1. Concern for preparing teachers of the disadvantaged in special ways and for preparing all teachers to accept cultural and linguistic diversity.

The panel members believe that programs for the disadvantaged should intensively involve the teacher-education staff with public school personnel and with behavioral and social scientists who apply research and theory to the needs and problems of disadvantaged areas. They further believe that college courses in such programs should be modified so that students can develop techniques and skills essential to teaching in depressed areas. Finally, they believe that a prospective teacher for the disadvantaged throughout his college years should have continuous relationships with children and adults in disadvantaged areas.

To increase the competency of *all* prospective secondary teachers to work with youngsters from diverse cultural backgrounds and with varied abilities, panelists believe that candidates should be required to take coursework in such fields as anthropology, sociology, and psychology; that they should have at least 100 hours of experience working with children of varied cultures outside the school environment; and that they not only should be familiar with differences in geographical and social dialects but should learn to find acceptable some forms of nonstandard English.

2. Concern for preparing secondary teachers of English to organize, present, and evaluate their subject in new ways.

If panelists had their way, a prospective secondary teacher of English would learn how to use in his subject field discovery approaches to learning; how to reveal clearly to students the social relevance of English; how to be a creator and manager of learning strategies and systems (i.e., how to develop curriculums). He would become proficient in using creative dramatics to involve students in his subject; he would learn how to evaluate instructional materials against behaviorally defined objectives; he woud be familiar with important research in learning and language development; and he would learn to evaluate his success not by his performance but by the changes wrought in his students.

3. Concern for offering prospective secondary teachers of English better and different instruction.

The prospective teacher, panelists believe, should be offered at least two substantive courses in English which could serve as models of how instruction in English should take place. Moreover, since he needs to know both his subject and the ways to teach it, the prospective teacher should be offered key courses in his major that are different from those designed for researchers or for those who will enter other fields.

4. Concern for evaluating the professional competency of the teacher.

Panelists would have a prospective secondary teacher of English not only pass a competency examination in advanced composition but be familiar with research and processes in the teaching of composition; they would require the candidate to pass competency examinations in oral interpretation of literature and/or spoken rhetoric; and they would have his pedagogical competencies evaluated according to performance criteria rather than by G.P.A., courses, and credits.

5. Concern for making the preparation of secondary teachers of English the joint responsibility of professors of English and professors of education.

To assure that there would be no unhealthy division between the responsibilities of professors of English and professors of education in preparing secondary teachers for the schools, panelists would have professors both of education and of English participate in regular seminars in which students discuss what they are learning on campus and in the schools.

Items which the panelists thought neither necessary nor highly desirable can be as significant in their implications as are the items to which they gave high priority. In the support for Guideline I of the English Teacher Preparation Study (discussed in chapter 1), this statement appears:

> The increasing frequency and intensity of problems of bilingualism and multi-dialectalism in American schools make it virtually imperative that both the elementary school teacher and the secondary school teacher of English be familiar with a foreign language, with the methods by which English is taught to speakers of another language or dialect, and with the psychological processes involved in learning a second language or dialect.

But the panel for English regarded the following item as only *slightly more than desirable* (X = 3.88) in the preparation of the teacher:

> A prospective secondary teacher of English should have a spoken and written command of one foreign language and some familiarity with its literature.[1]

Though support for Guideline III states that the teacher of English

> . . . should be able to analyze and discuss language as it is used in various media and literature as it is presented in such media as radio, television, motion pictures, and theatre

and though the panel on English indicated its belief that motion pictures and television would increasingly be taught as literary media, they did not believe it necessary that a prospective secondary teacher of English take a course designed for teacher candidates in movies, television, or radio (this item received a mean ($\overline{X}$) of 3.88). They believed more strongly, however, that the prospective teacher needs to learn how to employ all types of information systems and communication forms ($\overline{X} = 3.53$) and that he should come to understand the role and possibilities of educational technology through in-depth experience with computer-assisted instruction, instructional television, films, audio tapes, videotapes, records, overhead and opaque projectors, etc. ($\overline{X} = 3.53$). Curiously, the panel viewed learning ways to program computers with content from his subject field close to neither necessary nor desirable for the prospective secondary teacher of English ($\overline{X} = 5.29$). The "in-depth" experience with computer-assisted instruction they had in mind may not have been very deep.

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[1] To conserve space, items with a mean above 3.50 were not reported in table 29.

Discrepancies that appear to exist between views about preservice education expressed in the Guidelines of the *English Teacher Preparation Study* and the views of the panel on English can probably be accounted for in a number of ways. First, the composition of the panel was different from the composition of the study groups that contributed to the Guidelines. The panel, for example, contained no elementary or secondary teachers of English and no specialists in the uses of film or television in the teaching of English. Second, the panel had to discriminate between the terms *necessary* and *desirable*. No such discrimination is made in the Guidelines. One may assume that, were a panelist in charge of a program of teacher education, he might regard as necessary to his program items which, given the diversity of higher education, he would not mandate for other programs. Third, panelists who did not find some items necessary in the preservice education of the teacher might regard these same items as necessary in the continuing or inservice education of the teacher. Since no four- or five-year program can prepare a secondary teacher of English for all the exigencies of his professional career, *unnecessary in the preservice education of the teacher* does not mean *unnecessary in the education of the teacher.*

Questionnaire 4, Part II, is nowhere near as inclusive as the Guidelines in the number of components it contains relevant to the preparation of secondary teachers of English. But the panelists' response to the questionnaire does provide some notion of what twenty experts in English believe today should be part of that preparation if the profession is to educate its teachers for the future. Were recommendations from the Guidelines subjected to the same kind of weighting among *necessary*, *desirable*, and *neither necessary* *nor desirable* by those who participated in their construction, persons involved in programs to prepare secondary teachers of English might now have a clearer sense of priorities.

Afterthoughts

One learns from experience. But unlike some experiences which can be immediately repeated after one has profited from mistakes, a study to which eighty eminent educators contributed cannot be quickly redone, at least not with those same eighty. Their time is too precious and their travels too frequent and unpredictable for them to be able to give themselves unstintingly to a project that a researcher discovers en route may need refinement. At present, it is impossible to tell whether the eighty panelists are individuals who are conservative about how rapidly and how extensively innovations will affect the educational programs of secondary schools or whether the directions for Questionnaires 2 and 3 forced them to be more conservative than they otherwise would have been.

If requesting the panelists to estimate the probability of 20 percent implementation, i.e., to provide a percentage of a percentage, has any saving value, it is that the figure does provide some kind of operational definition for words like *more, greater emphasis, attention to, development of* that appear in many items. That is, at what time will the *more* or the *greater* or the *attention to* affect at least 20 percent of the educational programs or the student populations of the secondary schools? Without some kind of numerical referent, *greater* and *more* are too vague to attend to. However, much clearer operational definitions might have been provided merely by requesting the panelists to indicate the percentage of educational programs or student populations that would be affected by the innovation in each five-year time module. Though one percentage would have been preferable to two, wisdom came too late to start anew.

The 20 percent aside, most panelists revealed, if not conservatism, a reluctance to speculate far beyond developments already begun. The reluctance may have been rooted in a realistic understanding of how slowly education as an institution has accommodated itself to change in decades past. Nevertheless, as one panelist wrote after examining all of the questionnaires sent to the various panels,

> Almost all of the panels had difficulty envisioning anything so dramatically new during the next thirty years that is likely to change the shape or course of American education. Very few of the items predicted are unrelated to present developments.

The observation is accurate. If one studies the responses of the panel for English to Questionnaire 4, Part I, he begins to sense that the panel does not strongly believe that the future educational milieu, at least insofar as it influences the behavior and responsibilities of the secondary teacher of English, will differ greatly from the present milieu. Community control of schools would have less than some bearing on the teacher's behavior and responsibilities ($\bar{X} = 4.63$),[2] quantification of systems modeling techniques applied to secondary education, less than some bearing ($\bar{X} = 4.40$); installation and operation of educational facilities by private corporations, less than some bearing ($\bar{X} = 4.12$). Differential staffing, availability of television for closed-circuit and broadcast TV, increased participation of industrial organizations in producing and maintaining instructional materials, development of curriculums by school systems and private industry—none of these are viewed as developments that will have considerable influence on the performance of an instructor. Even student activism is seen as a force that will not have much more than some influence on the teacher's responsibilities and behavior ($\bar{X} = 3.53$).

From their responses, one might also surmise that the panelists suffered from being specialists, that they were perhaps insufficiently aware of or concerned about forces at work in the society which, though not within the traditional province of education, may nevertheless determine much of its substance and structure during the next three decades. The buildup of the military and its costs (not only is one of nine jobs in the U.S. under the fiscal control of the Department of Defense, but the nation is not yet secure despite over a trillion dollars having been spent since 1946 on national defense); relations between whites and nonwhites; the growth of cybernation and of leisure time; the pervasive use of drugs among the young; the possibilities of genetic and/or pharmacological control of individuals; the growth of free schools and the increasing militancy of junior and senior high students; the continuing contamination of the biosphere through industrial wastes, household garbage, automobile emissions, and pesticides; a rising global population; a shrinking world girdled by satellites; an apparent revolution in values—such are the forces that are now affecting the tone if not yet the content of public education. These forces cannot be ignored if one seriously forecasts what the functions of schools and teachers will be ten, twenty, thirty years hence.

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[2] To conserve space, items with a mean above 3.50 were not reported in table 28.

Yet the panelists should not be faulted if their responses seem to indicate ignorance of anything but a narrow range of specialties within education. They were asked what major developments *within their fields* they believed would alter secondary teachers' behavior and responsibilities, not what developments in general they intuited would most strongly affect education. If the latter question had been asked, panelists' responses might have differed greatly from those given.

What is increasingly apparent is that a forecast of secondary education, in order to be broadly enough based, should include the intuitions and insights of politicians, economists, sociologists, industrialists, students, demographers, ecologists, anthropologists, representatives of minority groups, spokesmen for academic disciplines, representatives of teachers' unions and professional organizations, militarists, biochemists—the list could continue.

Since it is almost impossible, however, to gather together for a sustained period of time persons representing the spectrum of groups and specialties that are having and/or will have strongest influence on secondary education, since corresponding with large numbers of experts is almost impossible for one to manage for long, and since the future is never fixed but is forever being made, about all that a teacher can do is to read widely, remain alert to forces having present or potential impact on secondary education, and give whatever emotional and intellectual energies he can to support those forces he believes salutary to education and life and resist those he believes baneful. If he is a teacher of teachers, then he should insist that at least one required course in preservice education concern itself with the future; in it, students should be required to read widely and voraciously about the future and to think in depth about what education now is, seems to be becoming, and should be within this society. If successful, such a course should help produce teachers more aware of the complexity and the process of change and more desirous of participating in that process than are teachers now in the schools. (In a time when everything seems to be affecting everything, not to assess the whole is to continue to trivialize education.)

In short, the present study is highly limited: it provides at best only a hint, a glimmering, of what changes in secondary education will occur between 1970 and 2000 A.D., of what the responsibilities of secondary teachers of English will be during this period, and of what alterations in preservice education should be made. Though limited, it does represent a beginning, one that its author hopes shall have no end.

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APPENDIX

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16. Professor Alan Purves
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17. Dr. Michael Shugrue
    Modern Language Association
    New York, New York
18. Dr. James R. Squire
    Boston, Massachusetts
19. Dean Erwin R. Steinberg
    Carnegie-Mellon University
20. Dr. Louise M. Rosenblatt
    New York University

III. *Learning Theory*

1. Dr. Richard Atkinson
   Stanford University
2. Dr. Carl Bereiter
   University of Illinois
3. Dr. Leslie J. Briggs
   Tallahassee, Florida
4. Dr. Joe L. Byers
   Okemos, Michigan
5. Dr. Vincent Campbell
   Portola Valley, California
6. Dr. Richard Bugelski
   New York State University, Buffalo
7. Dr. John B. Carroll
   Educational Testing Service
   Princeton, New Jersey
8. Dr. James Deese
   Johns Hopkins University
9. Dr. Stanford Ericksen
   University of Michigan
10. Dr. James G. Holland
    University of Pittsburgh
11. Dr. Wilbert McKeachie
    Dexter, Michigan
12. Dr. Harold E. Mitzel
    State College, Pennsylvania
13. Dr. Saul Sells
    Fort Worth, Texas
14. Dr. Irving E. Sigel
    Merrill-Palmer Institute
    Detroit, Michigan
15. Dr. Lee S. Shulman
    Michigan State University
16. Dr. William E. Vinacke
    State University of New York at Buffalo
17. Dr. John E. Coulson
    Santa Monica, California
18. Dr. Charles B. Ferster
    Silver Spring, Maryland

19. Dr. Evan R. Keislar
    University of California
    Los Angeles

IV. *Secondary Curriculum*

1. Dr. William Alexander
   University of Florida
2. Dr. Fred Husmann
   National Education Association
   Washington, D.C.
3. Dr. Stanley Dimond
   University of Michigan
4. Dr. Paul Dressel
   Michigan State University
5. Dr. Abraham S. Fischler
   Nova College
6. Dr. Dorothy McClure Fraser
   Hunter College
7. Dr. Jack E. Kittell
   University of Washington
8. Dr. William B. Michael
   University of Southern California
   Los Angeles
9. Dr. Arthur W. Foshay
   Teachers College, Columbia University
10. Dr. Aaron Harry Passow
    Columbia University
11. Dr. Galen Saylor
    University of Nebraska
12. Dr. J. Harlan Shores
    University of Illinois
13. Dr. J. Lloyd Trump
    National Association of Secondary School Principals
    Washington, D.C.
14. Dr. Ralph W. Tyler
    Chicago, Illinois
15. Dr. Staten Webster
    University of California
    Berkeley
16. Dr. Robert Bush
    Stanford, California
17. Dr. John Michaelis
    University of California
    Berkeley
18. Dr. Henry Robert Fea
    University of Washington
19. Dr. Vernon E. Anderson
    University of Maryland
20. Dr. Earl J. McGrath
    Temple University

IMPLICATIONS FOR TEACHING

The panel on English believed that the following developments would have considerable bearing on secondary English teachers' responsibilities, if implemented: the replacement of letter grades by more effective utilization of intrinsic motives to learn; the disappearance of lockstep instruction, with greater emphasis on student-paced, continuous-progress learning; individualized instruction by means of independent study, small-group activity, and non-computerized programed learning materials; a concerted national effort to attain clearly defined and understood goals of education; a better assessment of how students learn from meaningful discourse, followed by ways to diagnose teachers' discourse and ways to train them to improve modes of communication; the development of multi-level ungraded programs in each skill and content area, K-12; student participation in classroom dramatic activities, such as acting out plays, role playing, improvising drama; the development of reliable methods of teaching varieties of standard English to speakers of divergent dialects; and the movement from "content-oriented" to "process-oriented" programs in secondary English.

IMPLICATIONS FOR TEACHER EDUCATION

The panel on English judged the following items among those most necessary in the preservice education of a secondary teacher of English: learning how to use in his subject field discovery approaches to learning; learning how to reveal clearly to students the social relevance of English; learning how to be a creator and manager of learning strategies and systems; becoming familiar with the processes of language development in children; and taking course work in ancillary fields such as anthropology, sociology, and psychology.

In the panel's opinion, preparation for teaching the disadvantaged should include programs that intensively involve prospective teachers with successful classroom teachers, principals, counselors, and others in the planning, supervision, and evaluation of preservice experiences. Further, courses should be modified so that techniques and skills essential to teaching in depressed areas can be developed: diagnostic and remedial procedures, methods and materials for individualized instruction, strategies for classroom control, and use of personnel and material resources.

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